

# Cooper Ornithological Society 75<sup>th</sup> Annual Meeting



14-19 June 2005

**HUMBOLDT STATE UNIVERSITY**

Arcata, California

**Program & Abstracts**



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**Cooper Ornithological Society 75<sup>th</sup> Annual Meeting  
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# Cooper Ornithological Society 75<sup>th</sup> Annual Meeting

## *Meeting Schedule*

Start Time	Tuesday June 14	Wednesday June 15	Thursday June 16	Friday June 17	Saturday June 18	Sunday June 19
0600		<u>Bird walk</u> o Arcata Forest	<u>Bird walks</u> o Arcata Forest o Humboldt Bay	<u>Bird walks</u> o Arcata Forest o Arcata Marsh	<u>Bird walks</u> o Arcata Forest o Lanphere Dunes	<u>Field trips</u> o Redwood Nat'l Park  o Pelagic trip o Horse Mtn. o Humboldt Bay Refuge o Spotted Owls
0800		Board Meeting (8-5)  and  Symposium: <b>Beyond Mayfield: new approaches to analyzing nest success</b> (9-5)				
0830			<b>Ian Newton Plenary</b>	<b>Rocky Gutiérrez Plenary</b>	<b>John Goss-Custard Plenary</b>	
1000			Break	Break	Break	
1030			Scientific sessions*	Scientific sessions	Scientific sessions	
1200			Lunch	Lunch/Business Meeting	Lunch	
1330			Scientific sessions*	Scientific sessions	Scientific Sessions	
1500			Break	Break	Break	
1530			Scientific sessions*	Scientific sessions	<b>Katma** Presentation (Dov Lank)</b>	
1700						
1800						
1900	Board meeting	Welcome reception	Barbeque at Camp Bauer	Auctions and poster session	Banquet	
2100						
2200 2300						

\* On Thursday, one room is designated for the **Choices & Consequences of Avian Habitat Selection** symposium

\*\* The **Katma Award** is intended to encourage the formulation of new ideas that could change the course of thinking about the biology of birds. It is given to the author(s) of an outstanding paper published in *The Condor* or *Studies in Avian Biology* that offers unconventional ideas or innovative approaches, backed by a well-reasoned argument. It is given only when it is merited, no more than once a year. A full explanation of the award was published in 2003, *The Condor* 105(4):843.

# Cooper Ornithological Society 75<sup>th</sup> Annual Meeting

## *Essential Information & Reminders*

### Important Locations (see Campus Map, pages 44-45)

**Registration & Information Desk:** Karshner Lounge, University Center (T 1600-1900, W 0730-1900, Th, F, Sa 0730-1700)

**Welcome Reception:** Kate Buchanan Room, University Center

**On-campus housing:** Cypress, Hill, and Canyon Dormitories. A list of off-campus housing is available at <http://www.humboldt.edu/~cosmeet/housing.html> or the Information Desk.

**On-campus meals:** Jolly Giant Commons Cafeteria.

**Board of Directors' Meeting:** Nelson Hall 106

**Scientific Talks:** Kate Buchanan Room, University Center; Goodwin Forum, Nelson Hall; Fulkerson Recital Hall (Katma presentation)

**Poster Session:** Karshner Lounge, University Center (Friday)

**Vendors' Area:** South Lounge, University Center

**Business Meeting:** Jolly Giant Commons Cafeteria (Friday)

**Live & Silent Auctions:** Kate Buchanan Room, University Center (Friday)

**Student Mixer:** Kate Buchanan Room, University Center (Saturday)

**Banquet:** Kate Buchanan Room, University Center (Saturday)

**Bus shuttle to Camp Bauer Barbeque:** Jolly Giant Commons, ground floor (Thursday)

**Meeting place for Field Trips:** Jolly Giant Commons, ground floor

**Preview Room:** Nelson Hall East 116

### Posters & Presentations

**IT IS YOUR RESPONSIBILITY TO MAKE YOUR PRESENTATION AVAILABLE TO SESSION ORGANIZERS BEFORE YOUR SCHEDULED TALK.** Provide a labeled CD at registration or bring a USB thumb or flash drive to your session well in advance of your talk.

**Posters** should be put up in the Student Lounge, University Center by mid-day Friday, June 17. Poster authors will be available at their posters on Friday from 1900-2100. Posters must be taken down by mid-day Saturday.

### Contact Information

**24-hour Emergency Phone Numbers:**  
911 or 3456 (on campus) or 707-826-3456

**Non-emergency numbers for placing messages on message board:**  
5826 (on campus) or 707-826-3953

**Other information available at information desk in Karshner Lounge, University Center**

# Cooper Ornithological Society 75<sup>th</sup> Annual Meeting

## *Scientific Sessions at a Glance*

Start Time	Wednesday June 15
<b>Kate Buchanan Room</b> <b>Symposium.</b> BEYOND MAYFIELD: MEASUREMENTS OF NEST SURVIVAL DATA	
0900-1000	Introductory remarks & Opening presentation.
1000-1030	Break
1030-1200	New Methods
1200-1300	Lunch
1300-1440	Uses & interpretations of field data
1440-1500	Break
1500-1600	Panel discussion
1600-1700	Concluding remarks

Start Time	Thursday June 16	Friday June 17	Saturday June 18
0830-0900	<b>Kate Buchanan Room</b> Welcome & Introductory Remarks	<b>Kate Buchanan Room</b> Announcements & Introductory Remarks	<b>Kate Buchanan Room</b> Announcements & Introductory Remarks
0900-1000	<b>PLENARY 1</b> POPULATION LIMITATION IN BIRDS: A REVIEW OF THE EXPERIMENTAL EVIDENCE. <b>Ian Newton</b>	<b>PLENARY 2</b> SPOTTED OWLS: A QUARTER CENTURY OF CONTRIBUTIONS TO ORNITHOLOGY, ECOLOGY, AND WILDLIFE MANAGEMENT. <b>Rocky Gutiérrez</b>	<b>PLENARY 3</b> INDIVIDUAL-BASED MODELS AND THE MANAGEMENT OF WADING BIRD AND WILDFOWL POPULATIONS. <b>John Goss-Custard</b>
1000-1030	Break	Break	Break
	<i>Kate Buchanan Room</i>	<i>Kate Buchanan Room</i>	<i>Kate Buchanan Room</i>
	<i>Goodwin Forum</i>	<i>Goodwin Forum</i>	<i>Goodwin Forum</i>
1030-1200	Community Ecology	<b>Symposium.</b> Choices & Consequences of Habitat Selection	Conservation 1    Population Ecology 2    Habitat Relationships 1    Conservation 4
1200-1330	Lunch	Lunch	Lunch
1330-1500	Community Ecology cont'd, Behavior	<b>Symposium.</b> Choices & Consequences of Habitat Selection	Conservation 2    Population Ecology 3    Habitat Relationships 2    Genetics, Sytematics, Evolution
1500-1530	Break	Break	Break
1530-1700	Physiology, Population Ecology 1	<b>Symposium.</b> Choices & Consequences of Habitat Selection	Conservation 3    Migration <b>KATMA PRESENTATION</b> <b>Fulkerson Recital Hall</b> TOO MANY PEREGRINES CAUSE PROBLEMS: NEGLECTED INFLUENCE OF DANGER MANAGEMENT ON LIFE HISTORY OF THEIR PREY. <b>Dov Lank</b>

# Wednesday June 15

## Symposium – Beyond Mayfield: Measurements of Nest Survival Data

Start Time	Kate Buchanan Room
0900-0915	INTRODUCTORY REMARKS. <b>STEPHANIE JONES</b>
0915-1000	ESTIMATING NEST SUCCESS: THE MAYFIELD METHOD AND OTHER MEMORIES. <b>DOUGLAS H. JOHNSON</b>
1000-1030	Break
	<b>New Methods</b>
1030-1100	LOGISTIC-EXPOSURE MODEL FOR AVIAN NEST SURVIVAL AND NEST PARASITISM RATES. <b>TERRY L. SHAFFER</b> and Todd A. Grant
1100-1130	STATISTICAL MODELING OF NEST SURVIVAL USING SURVIVAL-TIME MODELING: THE VALUE OF COX PROPORTIONAL HAZARDS MODEL AND PARAMETRIC SURVIVAL TIME REGRESSION AND COMPARISON WITH OTHER STATISTICAL APPROACHES. <b>NADAV NUR</b> , Mark Herzog, Aaron L. Holmes, and Geoffrey R. Geupel
1130-1200	MODELING AVIAN NEST SURVIVAL IN PROGRAM MARK. <b>STEPHEN J. DINSMORE</b>
1200-1300	Lunch
	<b>Uses &amp; Interpretations of Field Data</b>
1300-1320	DOES THE MARKOV CHAIN FRAMEWORK RESULT IN BETTER NEST SURVIVAL ESTIMATES? <b>MATTHEW A. ETTERSON</b>
1320-1340	ANALYZING AVIAN NEST SURVIVAL IN FORESTS AND GRASSLANDS: A COMPARISON OF THE MAYFIELD AND LOGISTIC-EXPOSURE METHODS. <b>JOHN D. LLOYD</b> and Joshua J. Tewksbury
1340-1400	TIME-SPECIFIC VARIATION IN PASSERINE NEST SURVIVAL: NEW INSIGHTS FOR OLD QUESTIONS? <b>TODD A. GRANT</b> , Terry L. Shaffer, and Stephen K. Davis
1400-1420	MAKING MEANINGFUL PREDICTIONS OF NESTING SUCCESS FROM LOGISTIC EXPOSURE MODELS AND OTHER MODEL BASED METHODS. <b>FRANK R. THOMPSON III</b>
1420-1440	NEST SURVIVAL RELATED TO HUMAN INFRASTRUCTURE ON ALASKA'S COASTAL PLAIN; USING A COX PROPORTIONAL HAZARDS MODEL FOR DEPENDENT DATA. <b>TRENT McDONALD</b> , Joe Liebezeit, Steve Kendall, Philip Martin, R. Johnson, C. Rea, David Payer, Steve Zack, and Stephen Brown
1440-1500	Break
1500-1600	PANEL DISCUSSION. Geoff Geupel, moderator. Doug Johnson, Terry Shaffer, Nadav Nur, Steve Dinsmore, Jay Rotella, panelists.
1600-1700	CONCLUDING REMARKS: TAKING ADVANTAGE OF RECENT IMPROVEMENTS IN NEST-SURVIVAL MODELING AND IDENTIFYING FURTHER USEFUL IMPROVEMENTS. <b>JAY ROTELLA</b>

# Thursday June 16

## Schedule of Sessions

Asterisks preceding authors' names indicate competitors for student awards.

Start Time	Kate Buchanan Room	Goodwin Forum
0830-1000	<b>PLENARY 1</b> POPULATION LIMITATION IN BIRDS: A REVIEW OF THE EXPERIMENTAL EVIDENCE. <b>IAN NEWTON</b>	
1000-1030	Break	
	<b>Session – Community Ecology</b> <b>Chair – JOSEPH C. ORTEGA</b>	<b>Choices &amp; Consequences of Avian Habitat Selection – Symposium</b> <b>Chair – JOHN ROTENBERRY</b>
1030-1045	A COMPARISON OF BIRD POPULATIONS ON CALIFORNIA GROUND SQUIRREL COLONIES AND NON-COLONIZED GRASSLAND. <b>COLLEEN LENIHAN</b>	INTRODUCTORY REMARKS. <b>JOHN ROTENBERRY</b>
1045-1100	AVIAN COMMUNITY RESPONSE TO WILDLAND FIRE IN AN URBANIZING LANDSCAPE. * <b>ALISA ZYCH</b> and John Rotenberry	MEASURING HABITAT QUALITY: OPTIONS AND TRADE-OFFS. <b>MATTHEW D. JOHNSON</b>
1100-1115	THE INITIAL EFFECTS OF SALVAGE LOGGING ON BREEDING BIRD POPULATIONS IN ONE AREA OF THE 2002 MISSIONARY RIDGE FIRE, SOUTHWEST COLORADO. <b>JOSEPH C. ORTEGA</b> , Catherine P. Ortega, Joshua S. Walton, and Michael J. Vivalda	HABITAT UTILIZATION BY NEST PREDATORS: DOES IT MATTER TO NESTING BIRDS? <b>JOHN M. MARZLUFF</b>
1115-1130	TEMPORAL AND SPATIAL ORGANIZATION OF THE RAPTOR COMMUNITY AT THE LAGUNA DE SANTIAGUILLO BASIN, DURANGO, MEXICO. <b>JORGE NOCEDAL</b> and Manuel Calderón	
1130-1145	DIETARY RESPONSE OF THE ELEGANT TERN TO CHANGING OCEAN CONDITIONS AND PREY POPULATIONS IN SOUTHERN CALIFORNIA. * <b>KELLY CONNELL</b> and Michael Horn	EFFECTS OF INCOMPLETE INFORMATION IN COMPLEX HABITATS ON OCCUPANCY PATTERNS AND POPULATION DYNAMICS. <b>WILLIAM B. KRISTAN</b>
1145-1200	PATTERNS OF NECTAR AVAILABILITY AND HONEYCREEPER ABUNDANCE ACROSS AN ELEVATIONAL GRADIENT ON WINDWARD HAWAII. <b>PATRICK HART</b> , Bethany Woodworth, Katherine McClure, Kathryn Turner, Caleb Spiegel, Erik Tweed, Jaymi LeBrun, Katie Goodall, and Carlie Henneman	SOMEPLACE LIKE HOME: EFFECTS OF NATAL EXPERIENCE ON HABITAT PREFERENCE. <b>JUDY STAMPS</b>
1200-1330	Lunch	
	<b>Session – Community Ecology (cont.) &amp; Behavior</b> <b>Chair – NATHANIEL E. SEAVY</b>	<b>Choices &amp; Consequences of Avian Habitat Selection – Symposium</b> <b>Chair – WILLIAM B. KRISTAN</b>
1330-1345	EFFECTS OF PRESCRIBED BURNING ON BIRD COMMUNITY COMPOSITION IN CONIFEROUS FOREST OF NORTHERN CALIFORNIA. <b>NATHANIEL E. SEAVY</b> and John D. Alexander	IDENTIFYING "HABITAT SINKS:" A CASE STUDY OF COOPER'S HAWKS IN AN URBAN ENVIRONMENT. <b>R. WILLIAM MANNAN</b> and Clint Boal



Start Time	Kate Buchanan Room	Goodwin Forum
1345-1400	CASCADING EFFECTS OF HUMAN LANDSCAPE FRAGMENTATION: BEHAVIORAL RESPONSES TO BLACK-BILLED MAGPIES. <b>COURTLAND M. SMITH</b> and Douglas G. Wachob	WHY HABITAT QUALITY MATTERS: LINKING FITNESS AND THE CONSEQUENCES OF HABITAT SELECTION BY NORTHERN SPOTTED OWLS IN CALIFORNIA. <b>ALAN B. FRANKLIN</b>
1400-1415	FORAGING RESPONSE OF BARK-GLEANING BIRDS AND THEIR PREY TO EXPERIMENTAL FOREST MANIPULATIONS IN NORTHERN CALIFORNIA. * <b>CHRISTOPHER J. RALL</b>	
1415-1430	OPTIMAL GRIT ACQUISITION BY BLACK BRANT. * <b>EMILY R. BJERRE</b> and Jeffrey M. Black	SEASONAL INTERACTIONS AND CARRY-OVER EFFECTS: MEASURING THE CONSEQUENCES OF HABITAT OCCUPANCY JUST GOT A WHOLE LOT HARDER. <b>PETER P. MARRA</b>
1430-1445	CHANGE IN THE FIRST CATEGORY SONG OF A POPULATION OF HERMIT WARBLERS IN 11 YEARS. <b>STEWART JANES</b> and Lee Ryker	PLASTICITY IN NEST SITE SELECTION IN RESPONSE TO NEST PREDATORS: MANIPULATIVE EXPERIMENTS WITH ORANGE-CROWNED WARBLERS. <b>SUSANA PELUC</b> , Scott Sillett, and John Rotenberry
1445-1500	EVIDENCE FOR CHARACTER DISPLACEMENT IN THE SONGS OF YELLOW-RUMPED AND YELLOW-THROATED TINKERBIRDS. * <b>ALEXANDER KIRSCHER</b> , Daniel Blumstein, Hans Slabbekoorn, and Thomas Smith	CONSEQUENCES OF HABITAT CHOICE FOR RIPARIAN BIRDS: COMPARING RESTORED AND REMNANT SITES IN THE CENTRAL VALLEY. <b>CHRISSEY HOWELL</b> , Geoffrey Geupel, and Nadav Nur
1500-1530	Break	
	<b>Session – Physiology; Population Ecology 1 Chair – WALT KOENIG</b>	<b>Choices &amp; Consequences of Avian Habitat Selection – Symposium Chair – WILLIAM B. KRISTAN</b>
1530-1545	SEASONAL BODY WEIGHT VARIATION IN FIVE SPECIES OF WOODPECKERS. <b>WALT KOENIG</b> , Eric Walters, Jeff Walters, Jim Kellam, Klaus Michalek, and Matt Schrader	ARE HAYFIELDS ECOLOGICAL TRAPS FOR GRASSLAND SONGBIRDS? HABITAT SELECTION AND REPRODUCTIVE SUCCESS OF BOBOLINKS AND SAVANNAH SPARROWS IN AGRICULTURAL LANDSCAPES. <b>ALLAN M. STRONG</b> , Therese M. Donovan, Noah G. Perlut, and Neil J. Buckley
1545-1600	HORMONAL AND CELLULAR MECHANISMS OF MIGRATORY FATTENING IN THE DARK-EYED JUNCO. * <b>JENNIFER A. LONG</b> and Rebecca L. Holberton	SNAGS AND AVIAN NEST SITE SELECTION IN THE SIERRA NEVADA. <b>KAREN BAGNE</b> , Kathryn Purcell, and John Rotenberry
1600-1615	THERMOREGULATORY BENEFITS OF FEEDING IN HOUSE SPARROWS. <b>SHELDON J. COOPER</b> and Jeremy R. Arens	SOCIAL MECHANISMS CONSTRAIN MOVEMENT IN RESPONSE TO DECREASED FOOD AVAILABILITY IN TWO SPECIES OF WINTERING MIGRANTS. <b>DAVID BROWN</b> , Jennifer Long, and Thomas Sherry
1615-1630	PREDATION AND NEST SUCCESS OF FOREST BIRDS IN NATIVE AND NON-NATIVE HABITAT ON SAIPAN, MARIANA ISLANDS. <b>THALIA SACHTLEBEN</b> and Julie A. Savidge	
1630-1645	OFFSPRING QUALITY MATTERS IN A TROPICAL PASSERINE WITH A CLUTCH SIZE OF TWO EGGS. * <b>MATTHEW C. MEDEIROS</b> and Leonard A. Freed	CONCLUDING REMARKS. <b>WILLIAM B. KRISTAN</b>
1645-1700	BATTLE OF THE LILLIPUTIANS: INTERACTIONS BETWEEN CUP NESTING SONGBIRDS AND THEIR PREDATORS IN A PONDEROSA PINE FOREST. <b>T. LUKE GEORGE</b> and Steve Zack	

# Friday June 17

## Schedule of Sessions

Start Time	Kate Buchanan Room	Goodwin Forum
0830-1000	<b>PLENARY 2</b> SPOTTED OWLS: A QUARTER CENTURY OF CONTRIBUTIONS TO ORNITHOLOGY, ECOLOGY, AND WILDLIFE MANAGEMENT. <b>ROCKY GUTIÉRREZ</b>	
1000-1030	Break	
	<b>Session – Conservation 1</b> <b>Chair – TERRELL D. RICH</b>	<b>Session – Population Ecology 2</b> <b>Chair – SCOTT HORTON</b>
1030-1045	DISTRIBUTION OF RIPARIAN BIRD SPECIES IN AN URBANIZING LANDSCAPE. * <b>AMBER S. ONEAL</b> and John T. Rotenberry	HOW CAN WE ESTIMATE EFFECTS OF HABITAT CONSERVATION ON MARBLED MURRELET POPULATIONS? <b>SCOTT HORTON</b>
1045-1100	IMPACTS OF NON-NATIVE INVASIVE PERENNIAL PEPPERWEED ON BREEDING BIRD DISTRIBUTION AND REPRODUCTIVE SUCCESS IN SAN FRANCISCO BAY TIDAL MARSHES. <b>HILDIE SPAUTZ</b> and Nadav Nur	MODELING DISPERSAL BEHAVIOR AND URBAN POPULATION GROWTH OF AMERICAN CROWS IN THE SEATTLE AREA. <b>JOHN WITHEY</b> and John Marzluff
1100-1115	SAGEBRUSH BIRD POPULATION CHANGES IN SOUTHCENTRAL IDAHO – 1981-2004. <b>TERRELL D. RICH</b>	LOCAL AND REGIONAL TRENDS IN BREEDING AND MIGRATORY BIRD POPULATIONS IN THE KLAMATH AND ROGUE RIVER VALLEYS 1993-2003. <b>JOHN D. ALEXANDER</b> , Daniel C. Barton, and Nathaniel E. Seavy
1115-1130	CAN ECOLOGICAL RISK ASSESSMENT HELP US EVALUATE THE EFFECTS OF OIL SPILLS ON MARINE BIRDS? <b>JOHN WIENS</b> , Robert Day, and Stephen Murphy	
1130-1145	DO NORTH PACIFIC ALBATROSSES PREFER LONGLINES? <b>JEREMY R. BISSON</b> and David C. Duffy	PATTERNS OF TEMPORAL VARIATION IN GOSHAWK PRODUCTIVITY AND PREY RESOURCES. <b>SUSAN R. SALAFSKY</b> , Richard T. Reynolds, and Barry R. Noon
1145-1200	EXPENSIVE MANAGEMENT: QUANTIFYING THE COSTS OF AN ACTIVE HAZING PROGRAM IN ALEUTIAN GEESSE. * <b>ANNE E. MINI</b> and Jeffrey M. Black	HABITAT STRUCTURE, DIET AND POPULATION DENSITY OF BURROWING OWL IN THE MEXICAN PLAINS, IN GALEANA, NUEVO LEÓN, MÉXICO. <b>JOSE GONZALEZ</b> , Gabriel Ruiz, Irene Ruvalcaba, Miguel Cruz, and Armando Jiménez
1200-1330	Lunch	
	<b>Session – Conservation 2</b> <b>Chair – M. ZACHARIAH PEERY</b>	<b>Session – Population Ecology 3</b> <b>Chair – KENT C. JENSEN</b>
1330-1345	WEST NILE VIRUS IN SOUTHERN NEW MEXICO: ECOLOGICAL ASSOCIATIONS IN AN ARID ENVIRONMENT. * <b>HOLLY B. VUONG</b> , Don Caccamise, and Rebecca Creamer	NESTING SUCCESS AND CHICK SURVIVAL OF SYMPATRIC PRAIRIE GROUSE SPECIES IN CENTRAL SOUTH DAKOTA. <b>KENT C. JENSEN</b> , Mark A. Norton, Gregory A. Wolbrink, and Anthony P. Leif

Start Time	Kate Buchanan Room	Goodwin Forum
1345-1400	WEST NILE ANTIBODY PREVALENCE IN CALIFORNIA RAPTORS. * <b>JOSHUA HULL</b> , Angus Hull, John Keane, William Reisen, Ying Fang, Michael Bradbury, Richard Anderson, James Estep, Jeffery Dunk, Jennifer Blakesley, Thomas Munton, and Holly Ernest	CONSEQUENCES OF INDIVIDUAL CHOICE OF BROOD REARING AREAS AND CARRYOVER EFFECTS OF THESE DECISIONS ON REPRODUCTIVE MEASURES IN BLACK BRANT. <b>CHRISTOPHER NICOLAI</b> , James Sedinger, and Jason Schamber
1400-1415	POTENTIAL IMPACTS OF WEST NILE VIRUS ON SPOTTED OWL POPULATIONS. <b>TAMMY L. HAMER</b> and Alan B. Franklin	THE RELATIVE WEIGHTS OF NEW ZEALAND PASSERINE EGGS. <b>JAMES B. CUNNINGHAM</b>
1415-1430	COUNTING RAPTORS IN CLASS. <b>KIM SULLIVAN</b> and Amanda Bakian	NEST PREDATION RISK FACTORS FOR THE SPOTTED TOWHEE IN A RIPARIAN RESTORATION CONTEXT. <b>STACY L. SMALL</b> , Frank R. Thompson III, David Galat, Geoffrey R. Geupel, and John R. Faaborg
1430-1445	AGE RATIOS AS ESTIMATORS OF PRODUCTIVITY: ASSUMPTIONS AND APPLICATIONS TO MARBLED MURRELETS. <b>M. ZACHARIAH PEERY</b> , Benjamin H. Becker, and Steven R. Beissinger	FACTORS AFFECTING NEST AND POST-FLEDGING SURVIVAL IN A SWAINSON'S THRUSH POPULATION. * <b>JENNIFER D. WHITE</b> , Thomas Gardali, Frank R. Thompson III, and John Faaborg
1445-1500	POWER TO DETECT TRENDS IN MARBLED MURRELET BREEDING POPULATIONS USING AUDIO-VISUAL AND RADAR SURVEYS. <b>DAVID BIGGER</b> , M. Zachariah Peery, Jim Baldwin, Sal Chinnici, and Steven P. Courtney	POPULATION DECLINES OF NEARCTIC-NEOTROPICAL MIGRATORY LANDBIRDS APPEAR TO BE DRIVEN PRIMARILY BY PROCESSES THAT AFFECT OVERWINTERING SITE PERSISTENCE AND ANNUAL SURVIVAL. <b>DAVID F. DESANTE</b> , Danielle R. Kaschube, and James F. Saracco
1500-1530	Break	
	<b>Session – Conservation 3 Chair – ROSS CONOVER</b>	<b>Session – Migration Chair – PETER W. C. PATON</b>
1530-1545	AN EVALUATION OF FLUCTUATING ASYMMETRY AS A TOOL IN IDENTIFYING IMPERILED BIRD POPULATIONS. <b>JAMES ROURKE</b> , Barbara Kus, and Douglas Deutschman	A 33-YEAR STUDY OF AVIAN POPULATION TRENDS AT TWO COASTAL STOPOVER SITES IN RHODE ISLAND. <b>PETER W. C. PATON</b> and Jason E. Osenkowski
1545-1600	USING EGG FLOTATION AND EGGSHELL EVIDENCE TO DETERMINE AGE AND FATE OF ARCTIC SHOREBIRD NESTS. <b>TODD MABEE</b> , Ann Wildman, and Rick Johnson	STOPOVER ECOLOGY AND HABITAT SELECTION OF JUVENILE SWAINSON'S THRUSHES IN NORTHWESTERN CALIFORNIA. * <b>JAMES TIETZ</b> and Matt Johnson
1600-1615	COMPARISON OF PREDATORS AND PREDATION RATES BETWEEN NATURAL AND ARTIFICIAL SWAINSON'S THRUSH NESTS. * <b>REBECCA PIERCE RALL</b>	PLASMA METABOLITES OF THREE SHOREBIRD MIGRANTS DURING FALL STOPOVER IN THE MID-CONTINENT. * <b>NATHAN E. THOMAS</b> and David L. Swanson
1615-1630	TRIVIAL CHANGES AND FEEDING RANGES: HOW SLIGHT PHYSIOGNOMIC ADJUSTMENTS OF FIELD MARGIN HABITAT MAY ELIMINATE 'DEAD FORAGE ZONES' IN ADJACENT CROP FIELDS. * <b>ROSS CONOVER</b> and Eric Linder	SPATIAL AND TEMPORAL MIGRATION PATTERNS OF WILSON'S WARBLER IN THE SOUTHWEST REVEALED BY STABLE ISOTOPES. * <b>KRISTINA L. ECTON</b> , Charles van Riper III, and Tad C. Theimer
1630-1645	USE OF LIVE FENCES BY BIRDS IN A SUBANDEAN RURAL LANDSCAPE: IMPLICATIONS FOR CONSERVATION. <b>JIMENA PUYANA</b> and Luis Miguel Renjifo	AVIAN USE OF FOREST EDGES DURING SPRING AND FALL MIGRATION IN PENNSYLVANIA. <b>GREGORY S. KELLER</b> , David S. Klute, Bradley D. Ross, and Richard H. Yahner
1645-1700	MODELING POTENTIAL IMPACTS OF NON-NATIVE SPARTINA SPREAD ON SHOREBIRDS IN SOUTH SAN FRANCISCO BAY. <b>DIANA STRALBERG*</b> , V. Toniolo, G.W. Page, and L.E. Stenzel	DENSITY PATTERNS OF BUFF-BREASTED SANDPIPERS AT THREE BRAZILIAN WINTERING SITES. <b>JULIANA B. ALMEIDA</b> , Lewis W. Oring, and Richard B. Lanctot

# Saturday June 18

## Schedule of Sessions

Start Time	Kate Buchanan Room	Goodwin Forum
0830-1000	<b>PLENARY 3</b> INDIVIDUAL-BASED MODELS AND THE MANAGEMENT OF WADING BIRD AND WILDFOWL POPULATIONS. <b>JOHN GOSS-CUSTARD</b>	
1000-1030	Break	
	<b>Session – Habitat Relationships 1</b> <b>Chair – KATHRYN L. PURCELL</b>	<b>Session – Conservation 4</b> <b>Chair – MELISSA PITKIN</b>
1030-1045	AVIAN ABUNDANCE IN A MANAGED BOTTOMLAND HARDWOOD FOREST. * <b>MICHAEL BARANSKI</b> and Kim Marie Tolson	COMMUNICATING ORNITHOLOGICAL INFORMATION TO PROTECTED AREA MANAGERS AND THE PUBLIC THROUGH RESEARCH LEARNING CENTERS. <b>SALLIE J. HEJL</b>
1045-1100	ABUNDANCE, NEST SUCCESS, AND NEST SITE SELECTION OF WARBLING VIREOS ACROSS AN ELEVATIONAL GRADIENT IN THE SOUTHERN SIERRA NEVADA. <b>KATHRYN L. PURCELL</b> and Sylvia R. Mori	TWO BIRDS IN ONE NET: RESEARCH AND EDUCATION AT MIST-NETTING STATIONS. <b>MELISSA PITKIN</b>
1100-1115	A COMPARISON OF BIRD ABUNDANCE AND NESTING IN CLEARCUTS, HABITAT ISLANDS, AND MATURE CONIFEROUS FORESTS IN SOUTHWESTERN OREGON. * <b>JAIME L. STEPHENS</b> , John D. Alexander, and Stewart W. Janes	CONSERVATION OF SOUTHWESTERN WILLOW FLYCATCHERS: HOME RANGE AND HABITAT USE BY AN ENDANGERED BIRD. * <b>SUZANNE N. CARDINAL</b> , Eben. H. Paxton, and Tad C. Theimer
1115-1130	NEST-SITE SELECTION BY COOPER'S HAWKS ON MANAGED TIMBERLANDS IN COASTAL NORTHERN CALIFORNIA. <b>LAURA C. BRADLEY</b> , Sal J. Chinnici, and David Bigger	DISMAL STATUS OF THE EASTERNMOST SUBSPECIES OF THE BEWICK'S WREN. <b>DOUGLAS JAMES</b> and Andrea Green
1130-1145	A HABITAT PREDICTABILITY MODEL FOR GOLDEN EAGLES ON PRIVATE TIMBERLANDS IN COASTAL NORTHERN CALIFORNIA. <b>DANIEL R. DILL</b> , Sal J. Chinnici, and David Bigger	ECOLOGY AND MANAGEMENT OF NORTHERN SPOTTED OWLS ON COMMERCIAL TIMBERLANDS IN COASTAL NORTHERN CALIFORNIA. <b>LOWELL DILLER</b> , Keith Hamm, and Joel Thompson
1145-1200	PRODUCTIVITY AND HABITAT OF SYMPATRIC FERRUGINOUS HAWKS AND SWAINSON'S HAWKS IN THE SOUTHERN GREAT PLAINS. <b>CLINT W. BOAL</b> , Matthew D. Giovanni, and Heather A. Whitlaw	DISPERSAL AND RECRUITMENT IN A DECLINING METAPOPOPULATION: THE MEXICAN SPOTTED OWL IN WEST-CENTRAL NEW MEXICO. <b>PETER B. STACEY</b>
1200-1330	Lunch	
	<b>Session – Habitat Relationships 2</b> <b>Chair – JOSÉE ROUSSEAU</b>	<b>Session – Genetics, Systematics, Evolution</b> <b>Chair – MATTHEW G. FAIN</b>
1330-1345	GRASSLAND BIRD NEST SURVIVAL IN RESTORED AND REMNANT PRAIRIES IN NORTHWESTERN IOWA. * <b>EMBERE HALL</b> and Rolf Koford	USING A COLORIMETER TO ASSESS VARIATION IN THE PLUMAGE COLORATION OF THE WILLOW FLYCATCHER. <b>EBEN PAXTON</b> , Caroline Causey, Thomas Koronkiewicz, Mark Sogge, Matt Johnson, and Mary Anne McLoud

Start Time	Kate Buchanan Room	Goodwin Forum
1345-1400	INFLUENCE OF HABITAT ON NEST SURVIVAL OF SNOWY AND WILSON'S PLOVERS IN TEXAS. * <b>SHARYN L. HOOD</b> and Stephen J. Dinsmore	GENETIC STUDIES OF ARIZONA NORTHERN GOSHAWKS: EVALUATING MOLTED FEATHERS AS A SOURCE OF DNA AND ASSESSING POPULATION GENETIC STRUCTURE. * <b>SHELLEY BAYARD DE VOLO</b> , Richard Reynolds, and Mike Antolin
1400-1415	HABITAT AND SPATIAL VARIABILITY IN CALIFORNIA SPOTTED OWL POPULATION VITAL RATES. <b>MARK SEAMANS</b> and Rocky J. Gutiérrez	A MULTIGENE PHYLOGENY OF GRUES (Aves: Gruiformes). <b>MATTHEW G. FAIN</b> , Peter Houde, and Carey Krajewski
1415-1430	GREEN-TAILED TOWHEE RESPONSE TO PRESCRIBED FIRE IN MOUNTAIN SHRUBLAND. * <b>GRETCHEN JEHLE</b> , Julie A. Savidge, and Natasha B. Kotliar	THE LONG AND SHORT OF AMAKIHI BILL EVOLUTION IN HAWAII. <b>LEONARD FREED</b> , Rebecca Cann, and Matthew Medeiros
1430-1445	PREDICTING ABUNDANCE OF MARBLED MURRELET NESTING PLATFORMS FROM TREE DIAMETER. <b>MARTIN G. RAPHAEL</b>	
1445-1500	AVIAN DIVERSITY, ASSEMBLAGES AND USE OF VEGETATION, MAINLY BY SHRUB-NESTERS, IN AN URBAN ECOSYSTEM. <b>JOSÉE ROUSSEAU</b> , Jean-Pierre Savard, and Rodger Titman	
1500-1530	Break	
	<b>Fulkerson Recital Hall</b>	
1530-1600	INTRODUCTION and EXPLANATION OF THE COOPER SOCIETY'S KATMA AWARD. <b>BONNIE BOWEN</b>	
1600-1700	<b>KATMA PRESENTATION</b> TOO MANY PEREGRINES CAUSE PROBLEMS: NEGLECTED INFLUENCE OF DANGER MANAGEMENT ON LIFE HISTORY OF THEIR PREY. <b>DOV LANK</b>	

# Friday June 17

## Posters

CONSPECIFIC ATTRACTION IN THE BAIRDS SPARROW. \***MARISSA A. AHLERING**, Douglas H. Johnson, and John Faaborg

EFFECTS OF HABITAT FRAGMENTATION ON LANDSCAPE-LEVEL PROCESSES AND STOPOVER HABITAT ASSOCIATIONS OF NEARCTIC-NEOTROPICAL MIGRATING BIRDS. \***JULIAN AVERY** and Gregory Keller

CHARACTERIZING MARBLED MURRELET NESTING HABITAT IN NORTHERN CALIFORNIA BASED ON DIRECT EVIDENCE OF NESTING. **DAVID BIGGER** and Sal Chinnici

PHYSIOLOGICAL CONDITION OF OVER-WINTERING OVENBIRDS IN RESPONSE TO MANIPULATION OF FOOD AVAILABILITY. **DAVID BROWN**, Thomas Sherry, Jennifer Long, and Rebecca Holberton

DEALING WITH PSEUDOREPLICATION IN APLOMADO FALCON NEST PRODUCTIVITY DATA BY USING GENERALIZED LINEAR MIXED MODELS. \***JESSI L. BROWN**, Michael W. Collopy, Erin J. Gott, Paul W. Juergens

EFFECTS OF GAME MANAGEMENT PRACTICES ON THE AVIFAUNAL ABUNDANCE OF TWO LOUISIANA WILDLIFE MANAGEMENT AREAS. \***AMANDA CARROLL** and Kim Marie Tolson

HABITAT CHARACTERISTICS OF AMERICAN AVOCET AND BLACK-NECKED STILT NURSERIES. **JENNIFER CARY** and John F. Cavitt

THE EFFECTS OF OFF HIGHWAY VEHICLES ON THE NORTHERN GOSHAWK. **JEFFREY R. DUNK**, John Keane, Jennifer van Gelder, Taro Narahashi, Nathan Hostetter, Stacey Vigallon, Hattie Oswald, Ann Bowles, and Tina Yack

INFLUENCE OF POST-FIRE TIMBER HARVEST ON BLACK-BACKED WOODPECKER NEST SURVIVAL. \***CHRIS FORRISTAL** and Victoria Saab

IS BRUSH FOR THE BIRDS?: THE ROLE OF UNDERSTORY VEGETATION IN MAINTAINING DIVERSITY IN MANAGED FORESTS. **JOAN HAGAR**, Kate Dugger, and Ed Starkey

DEVELOPING GENERAL INDICES FOR AGEING NESTLINGS. AN EVALUATION USING FOUR SPECIES. **DENNIS JONGSOMJIT**, Stephanie L. Jones, Nadav Nur, Thomas M. Haggerty, Ryan D. Burnett, Thomas Gardali, and Geoffrey R. Geupel

U.S. FISH AND WILDLIFE SERVICE LAUNCHES NEW MONITORING AND ADAPTIVE MANAGEMENT INITIATIVE. **MELINDA G. KNUTSON**, Harold Laskowski, and Socheata Lor

BRINGING ORNITHOLOGY TO K-12 CLASSROOMS. \***JENNIFER A. LONG** and Brent M. Horton

ANTIBODY PREVALENCE OF WEST NILE VIRUS IN THE BIRDS OF NORTHWESTERN ARKANSAS DURING THE 2004 TRANSMISSION SEASON. \***ANDY LOWRY**, Lisa Newberry, Dustan Clark, Max Miesch, and Doug James

THE CONSERVATION RESERVE PROGRAM AND SHRUBSTEPPE-ASSOCIATED BIRDS IN EASTERN WASHINGTON. **W. MATTHEW VANDER HAEGEN** and Michael A. Schroeder

# Abstracts for Presentations

- 1    **CONSPECIFIC ATTRACTION IN THE BAIRD'S SPARROW.** \***MARISSA A. AHLERING**, Dept. Biology, Univ. of MO, Columbia, MO 65211; Douglas H. Johnson, USGS, Northern Prairie Wildlife Res. Ctr., Jamestown, ND 58401; John Faaborg, Dept. Biology, Univ. of MO, Columbia, MO 65211. Con-specific attraction affected territory establishment of Baird's Sparrows in the upper Great Plains during the 2004 breeding season. We established six experimental playback plots and six control plots at two sites within the Baird's Sparrow's breeding range controlling for the influence of habitat quality. Baird's Sparrows colonized three of the six experimental plots and none of the six control plots. Males that did colonize the experimental plots established territories adjacent to the playback stations and consistently counter-sang with the recorded songs. Vegetation was statistically homogeneous among all study plots. In addition, the vegetation characteristics of the plots did not significantly explain the variation in density among plots or within the treatment plots. Poster
- 2    **LOCAL AND REGIONAL TRENDS IN BREEDING AND MIGRATORY BIRD POPULATIONS IN THE KLAMATH AND ROGUE RIVER VALLEYS 1993-2003.** **JOHN D. ALEXANDER** and Daniel C. Barton, Klamath Bird Observatory, Ashland, OR 97520; Nathaniel E. Seavy, Dept. of Zoology, Univ. Florida, Gainesville, FL 32611. We monitored bird populations from 1993-2003 using mist nets at two riparian banding stations, one on the Klamath River in northern California and the other on the Rogue River in southern Oregon. We used these data to investigate population trends of 31 species of breeding and fall migrant birds and compared these population trends with those from the Breeding Bird Survey (BBS) Southern Pacific Rainforest Physiographic Strata for the same time period. Qualitatively, the BBS and mist-netting trends corresponded well; the direction of most trends was consistent across the different data sets. However, when compared quantitatively with Spearman rank correlations, we found that the relationship between mist-netting trends and BBS trends was generally weak. We also found little correspondence between trends at the Rogue River site and Klamath River site during the breeding season, suggesting that different population-level processes may be occurring at each site. Comparing local trends to larger-scale BBS results provides information about local and regional population trends and adds to the increasing evidence that regional population declines are occurring in songbirds. F 1100-1115
- 3    **DENSITY PATTERNS OF BUFF-BREASTED SANDPIPERS AT THREE BRAZILIAN WINTERING SITES.** **JULIANA B. ALMEIDA**, Ecol. Evol. and Conserv. Biol. Program, Univ. Nevada, Reno, NV 89557; Lewis W. Oring, Environ. Res. Sci. Dept., Univ. Nevada, Reno, NV 89557; Richard B. Lanctot, USFWS Migratory Bird Mgmt, Anchorage, AK 99503. The Buff-breasted Sandpiper's (BBSA) "highly imperiled – global species" status demands the use of accurate methods to monitor population sizes and trends. Wintering sites are ideal for monitoring BBSA because of the clumped and predictable distribution this species assumes in South America. We monitored BBSA abundance at three major wintering sites in Brazil: Parque Nacional da Lagoa do Peixe (A), Ilha da Torotama (B) and Estação Ecológica do Taim (C). Abundance was recorded during the austral summers of 2002, 2003 and 2004. Density patterns differed for each site, both among and within years. Site A had fairly constant densities with two high peaks, but slightly decreasing numbers throughout the austral summers. The density pattern for site B was similar to site A, but with different overall densities. At site C, the density pattern differed among years, showing a decrease in the first year, and having virtually no birds in the second and third years. These density patterns suggest the first two sites are important for BBSA, either as final wintering area or stopover site, or both. The importance of site C appears to depend on water levels, which influence the availability of suitable habitat. The design of future surveys aimed at estimating population size or trends of BBSA on the wintering grounds should take into account differences in yearly use by BBSA at individual wintering sites. F 1645-1700
- 4    **EFFECTS OF HABITAT FRAGMENTATION ON LANDSCAPE-LEVEL PROCESSES AND STOPOVER HABITAT ASSOCIATIONS OF NEARCTIC-NEOTROPICAL MIGRATING BIRDS.** \***JULIAN AVERY** and Gregory Keller, Dept. Biology, Eastern New Mexico Univ., Portales, NM 88130. Many Nearctic-Neotropical migratory songbirds have been experiencing long-term declines in North America. Unfortunately, the distribution and habitat requirements of these migrants and their responses to habitat fragmentation during the migratory period are poorly understood. I am conducting surveys within a variety of habitats in New Mexico during the spring and fall migratory periods of 2004-05 to ascertain the effects of fragmentation on: avian abundance; species richness; and avian guilds. I recorded a total of 85 species in all study sites combined. Species richness was highest in pinyon/juniper habitat and lowest in spruce/fir habitat. Ponderosa pine forest exhibited intermediate levels of species richness. Many species were restricted in their distributions among habitats. Black-throated Gray Warbler was only found within pinyon/juniper habitat, while Plumbeous Vireo and Grace's Warbler were dominant species in Ponderosa Pine habitat but did not occur elsewhere. Habitat associations appear to be relatively stable and predictable during spring but not during fall migration. After my second year of data collection, I believe that these results will provide valuable insight into stopover habitat associations for birds in general, as well as within New Mexico. Identifying causes of population declines during migration and better understanding the role played by habitat fragmentation is a critical approach to the conservation of migratory songbirds. Poster
- 5    **SNAGS AND AVIAN NEST SITE SELECTION IN THE SIERRA NEVADA.** \***KAREN BAGNE**, Dept. of Biology, UC Riverside, Riverside, CA 92521; Kathryn Purcell, USDA Forest Service, Pacific Southwest Research Station, 2081 E. Sierra Ave, Fresno, CA 93710; John Rotenberry, Dept. of Biology, UC Riverside, Riverside, CA 92521. Snags are important resources for a wide range of wildlife including breeding birds. We examined the characteristics of snags selected by avian species and the consequences of this choice on nest success in the southern Sierra Nevada, CA. R 1545-1600

Data were collected on snag attributes including tree species, height, diameter, and decay class across nine 40-hectare plots of mature forest. Data were collected on random snags and snags containing known nests of a variety of snag-nesting birds. We monitored a subset of the used nests throughout the nesting cycle. Using discriminant function analysis (DFA) we examined the snag characteristics that separated used from available snags. All variables except snag height and certain uncommon tree species were important in distinguishing between used and available snags. We then used a generalized linear model to examine the relationship between daily survival rates and the selected snags. Competing models of daily survival rates were then compared using Akaike's Information Criterion (AIC). Of the selected snag characteristics, only tree species was important for predicting daily survival rates for all bird species combined. Specifically, daily survival rates were higher in ponderosa pine snags (0.985), and lower in white fir snags (0.977) as compared to incense cedar combined with other less common species (0.981). We suggest that other variables related to snag choice, such as decay, are physical constraints to nest construction rather than attributes that directly affect nest success. Our data suggest that managers, rather than just using snag numbers, can use snag characteristics to conserve preferred snags that, in our case, were primarily large ponderosa pines.

- 6 AVIAN ABUNDANCE IN A MANAGED BOTTOMLAND HARDWOOD FOREST. **\*MICHAEL BARANSKI** and Kim Marie Tolson, Dept. Biology, Univ. of Louisiana, Monroe, LA 71209. Bottomland hardwood forests were once common features of the landscape across much of the southeastern United States. However, manipulation of bottomland hardwoods through timber harvesting, agriculture, and urban sprawl has reduced these forested areas to only a fraction of their original range. Historically, the Louisiana Department of Wildlife and Fisheries (LDWF) focused wildlife management practices on game species, resulting in a paucity of data on non-game species. The purpose of this project is to extend the understanding of the relationship between forest management protocols and breeding bird species, so that future timber management practices can include avian considerations. Breeding bird surveys were conducted from April 2003/2004 through the first week of July 2003/2004 at Buckhorn Wildlife Management Area (BWMA). Four different treatment areas were surveyed: salvage, group select, single-tree select, and mature. Of the 36 species analyzed, 16 showed treatment effects ( $P < 0.05$ ), 13 showed treatment effects between even-aged and uneven-aged management, and 10 showed treatment effects within uneven-aged management. Abundance of species varied greatly among the four treatments. The orchard oriole, indigo bunting, and yellow-breasted chat were most abundant in salvage and group select treatment. Brown-headed cowbirds were most abundant in group select but no significant differences occurred between treatments. Blue-gray gnatcatcher and Eastern wood-pewee were most abundant in single-tree treatment. High priority forest species such as the Acadian flycatcher, hooded warbler, prothonotary warbler, and wood thrush were most abundant in mature tracts. Species richness and total detections/point count for each treatment are: salvage 34, 12.02; group 38, 13.32; single-tree 36, 13.81; mature 31, 13.74. Timber treatments conducted by the LDWF greatly affect avian abundance and diversity. The utilization of a mixture of timber treatments is recommended to increase habitat diversity in order to support a higher species richness and abundance. This study was supported by funds provided by LDWF & USFWS, Division of Federal Aid through State Wildlife Grants Program. S 1030-1045
- 7 GENETIC STUDIES OF ARIZONA NORTHERN GOSHAWKS: EVALUATING MOLTED FEATHERS AS A SOURCE OF DNA AND ASSESSING POPULATION GENETIC STRUCTURE. **\*SHELLEY BAYARD DE VOLO**, Dept. of Biology, Colorado State Univ., Fort Collins, CO 80523; Richard Reynolds, Rocky Mtn. Research Station, 2150 Centre Ave., Bldg. A, Ste. 350, Fort Collins CO 80526; Mike Antolin, Dept. of Biology, Colorado State Univ., Fort Collins, CO 80523. The Northern Goshawk is a wide-ranging, top-level predator of management and conservation concern. Knowledge of the species' population dynamics and genetics is lacking, mostly because of the high costs and difficulties associated with monitoring populations. Molecular genetic tools, however, can provide cost-effective methods for understanding population history, connectivity and dynamics. We present results from two studies where molecular methods were used to better understand Arizona Northern Goshawk populations. In one study, we assessed the usefulness of molted feathers as a source of DNA for genetic studies by evaluating the genotyping errors associated with this tissue. We found PCR success was affected by DNA extraction method, but not feather type. Tail feathers provided significantly higher yields of DNA than other feather types, but even small covert feathers often provided amplifiable DNA. Lastly, allele-drop occurred in only small feathers for only one of four micro-satellite loci tested. In another study, we assessed population genetic structure for goshawks in Arizona. Micro-satellite divergence between northern (Kaibab Plateau) and southern (Sky Islands; putative Apache Goshawk range) Arizona populations was small [ $F_{st} = 0.034$ ; (0.007, 0.064)] indicating contemporary gene flow connects the two regions. Likewise, little divergence ( $\Theta_{tp} = 0.09$ ) in mtDNA (d-loop) was found indicating historical gene flow also occurred. Management implications include considerations that if the "Apache" Goshawk sub-species status is accepted (our current data do not support nor reject its status), its range likely extends as far northward as the Kaibab Plateau, on the Utah border. S 1345-1400
- 8 CHARACTERIZING MARBLED MURRELET NESTING HABITAT IN NORTHERN CALIFORNIA BASED ON DIRECT EVIDENCE OF NESTING. **DAVID BIGGER** and Sal Chinnici, SCOPAC, Scotia, CA 95501. Land managers are challenged to develop effective conservation strategies for, and promote the recovery of the Californian endangered marbled murrelet. In northern California, little is known about murrelet nesting habitat due to the species' cryptic breeding plumage and behavior. In this study, we describe the habitat characteristics of 22 nesting locations in southern Humboldt County, California, comprised of locations of actual nest trees, findings of murrelet eggshell fragments on the forest floor, and grounded murrelet chicks. To characterize nesting habitat, we compared sites attributes and habitat around the nest sites to random sites in old growth forests. We tested common metrics that are used to indirectly classify marbled murrelet nesting habitat, and found that intact old growth habitat with relatively high densities of nesting platforms and closeness to streams were the best predictors of murrelet nesting. Our findings should aid land managers in evaluating conservation strategies, including land set-asides, for the marbled murrelet. Poster
- 9 DO NORTH PACIFIC ALBATROSSES PREFER LONGLINES? **JEREMY R. BISSON**, Dept. Zoology, University of Hawaii at Manoa, Honolulu, HI 96822; **DAVID C. DUFFY**, Department of Botany, University of Hawaii at Manoa, Honolulu, HI 96822. We determined the effect of tuna and swordfish pelagic long-line fishing in the North Pacific on F 1130-1145



the diet of Laysan and Black-footed Albatrosses using stable nitrogen isotopes to determine trophic positions, and digestive tract content analysis to determine important prey. The majority of the diet of long-line associating albatrosses was not related to the fishery, though fish bait and squid bait were well represented. Long-line associating Laysan Albatrosses were feeding at a higher average trophic position than Laysan Albatrosses salvaged from the Northwestern Hawaiian Islands, suggesting that birds associating with long-lining may poorly represent normal albatross foraging behavior. Though long-line associating Black-footed Albatrosses were feeding at higher trophic positions than long-line associating Laysan Albatrosses, Black-footed Albatrosses associating with swordfish long-lining were feeding at higher trophic positions than those associating with tuna. Albatrosses associating with swordfish vessels are commonly seen feeding on floating dead swordfish carcasses and Black-footed Albatrosses are more common around swordfish vessels despite smaller worldwide Black-footed Albatross populations. Though non-long-line associated food items differed significantly between Laysan and Black-footed Albatrosses, the differences in trophic position between these species is most likely due to a greater influence from swordfish fishing on Black-footed Albatrosses.

- 10 OPTIMAL GRIT ACQUISITION BY BLACK BRANT. **\*EMILY R. BJERRE** and Jeffrey M. Black, Dept. Wildlife, Humboldt State Univ., Arcata, CA 95521. Black brant arriving at spring stopover areas are under energetic demands to build-up endogenous nutrient reserves for migration and breeding efforts. To understand how brant meet these demands, research has focused on questions relating to foraging efficiency, feeding site selection, and disturbance. Little attention has been given to the importance of gritting sites at staging areas. Grit facilitates the mechanical breakdown of ingested plant materials, aiding efficient digestion and potentially playing a significant role in the daily energy budget decisions made by brant. In some bird species grit is also a significant source of important minerals such as calcium. We investigated whether brant obtained grit in an optimal manner at the primary gritting site in Humboldt Bay, CA. We found that grit in the gizzards of hunter-killed brant was significantly larger than average grain size found at the gritting site (mean weight diameter = 0.4 mm vs. 0.2 mm). We also found that greater numbers of brant and a larger proportion of brant flocks present at the gritting site were actively ingesting grit at lower tides when eelgrass beds should be available for foraging. Our findings suggest brant are acquiring much larger grit than what is generally available at the gritting site and are staying at the gritting site longer than expected if brant are simply maximizing feeding opportunities. Brant in Humboldt Bay may be balancing trade-offs of maximizing feeding time on the bay with selectively ingesting grit to meet specific physiological needs. R 1415-1430
- 11 PRODUCTIVITY AND HABITAT OF SYMPATRIC FERRUGINOUS HAWKS AND SWAINSON'S HAWKS IN THE SOUTHERN GREAT PLAINS. **CLINT W. BOAL**, USGS TX Coop. Fish & Wildlife Res. Unit, Texas Tech Univ., Lubbock, TX 79409; Matthew D. Giovanni, Dept. Range, Wildlife and Fisheries Management, Texas Tech Univ., Lubbock, TX 79409; Heather A. Whitlaw, TX Parks and Wildlife, Lubbock, TX 79409. Little information exists on the nesting habitat of sympatric grassland raptors in the Southern Great Plains. We monitored nesting and assessed habitat selection of Ferruginous Hawks and Swainson's Hawks in Dallam County, Texas, Cimarron County, Oklahoma, and Union County, New Mexico during the breeding seasons of 2001-2004. Eighty-one Ferruginous Hawks nesting attempts resulted in  $1.75 \pm 0.17$  young/nesting attempt and  $2.68 \pm 0.13$  young/successful nest, but nesting success varied among years (41.7 – 82.7%). Two hundred and fifty-nine Swainson's Hawk nesting attempts resulted in  $1.11 \pm 0.07$  young/nesting attempt and  $1.86 \pm 0.06$  young/successful nest, but nesting success was more consistent among years (52.8 – 68.4%). Inter-year nest site re-occupancy was 74% for Ferruginous Hawks and 70% for Swainson's Hawks. The majority of Ferruginous Hawk nests were placed on platforms (28%) specifically erected as nest substrates for the species, or on windmills (14%). In contrast, only 2% of Swainson's hawk nests were placed on man-made structures. Swainson's Hawks tended to select taller substrates for nesting structures, but both species appeared to nest more frequently in single isolated structures rather than windbreaks or groves. Ferruginous Hawk nest sites had fewer trees within 60m of the nest and more grass-forb cover than did those of Swainson's Hawks. Ferruginous Hawks also nested significantly farther from roads, center pivot agriculture fields and occupied buildings than did Swainson's Hawks. Best subsets analysis indicated the number of trees and amount of grass-forb cover within 60m of nest sites and the distance to roads and occupied buildings differentiated Ferruginous Hawk and Swainson's Hawk nest sites best. S 1145-1200
- 12 NEST-SITE SELECTION BY COOPER'S HAWKS ON MANAGED TIMBERLANDS IN COASTAL NORTHERN CALIFORNIA. **LAURA C. BRADLEY**, Sal J. Chinnici, and David Bigger Ph.D., SCOPAC, Scotia, CA 95565. We examined nest-site selection by Cooper's hawks on managed timberlands in the redwood region of north coastal California. Twenty-seven nests representing 14 nesting territories were located between 1999 and 2003. Site re-occupancy was 100% in the years following initial nest discovery with new nests generally built within 125-m of the previous years nest. All nests were found in live trees, 57% in hardwood, 29% in Douglas or grand fir and 14% in redwood. Redwood was used significantly less than expected compared to random plots. At the level of the nest-site, Cooper's hawks selected areas containing trees that were 21% taller with 20% shallower crowns than trees in random plots. Nest sites also contained significantly more hardwoods (>28-cm dbh) and had taller, more open under-stories. The presence of hardwood (e.g. tanoak) was a significant component at the level of the nest stand. Finally, nest trees were located twice as far from roads and significantly closer (i.e. half the distance) to northern spotted owl activity centers. The size of habitat buffers maintained around nests located within timber harvesting plans varied in size and is discussed in relation to productivity and re-occupancy in subsequent years. S 1115-1130
- 13 SOCIAL MECHANISMS CONSTRAIN MOVEMENT IN RESPONSE TO DECREASED FOOD AVAILABILITY IN TWO SPECIES OF WINTERING MIGRANTS. **DAVID BROWN**, Dept. EE Biology, Tulane University, New Orleans, LA 70118; Jennifer Long, Dept. of Biological Sciences, Univ. of Maine, Orono, ME 04469; Thomas Sherry, Dept. EE Biology, Tulane University, New Orleans, LA 70118. For wintering land-bird migrants, the arrival period represents the first and probably most important habitat selection period of the season. Following arrival, as the season progresses, migrants are faced with unpredictable or outright declining availability of resources, principally food. Habitat selection continues through the season as individuals monitor availability and adjust their distributions to better match resource variation. Within-season habitat selection occurs at multiple spatial scales via a gradient of behavioral movement strategies. For instance, in an environment with declining food availability, floaters may detect and colonize high R 1600-1630

quality patches, while territorial individuals may expand their home ranges to include sufficient resources. However, intra-specific social interactions may impede individuals from adjusting spatially to resource variation. We used experimental food manipulations to test the prediction that individuals track resource availability and match their local distribution accordingly. We reduced food availability of two species, a short distance migrant, the Hermit Thrush wintering in Louisiana, and a long distance migrant, the Ovenbird wintering in Jamaica. In both species, most individuals maintain distinct home ranges with varying degrees of overlap, but strong site fidelity. For Hermit Thrush we reduced within territory fruit availability with manual removal of fruiting shrubs. For Ovenbirds, we reduced ant availability with plot-level application of ant-bait pesticide. Based on radio-telemetry estimates, we found that neither species increased home range sizes in response to substantial reductions of food. Even Ovenbirds on a negative energy budget did not expand home range sizes. Additional evidence suggests that within the study systems these species are at or near saturation densities and are involved in frequent agonistic interactions. We suggest that local-scale intra-specific competition may constrain the ability of 'sedentary' wintering migrants to modify their movement behavior in an environment of declining resource availability. Additional study is needed to understand how social interactions during autumn arrival influence behavior and population processes throughout winter.

- 14 **PHYSIOLOGICAL CONDITION OF OVER-WINTERING OVENBIRDS IN RESPONSE TO MANIPULATION OF FOOD AVAILABILITY.** **DAVID BROWN** and Thomas Sherry, Dept. EE Biology, Tulane Univ., New Orleans, LA 70118; Jennifer Long and Rebecca Holberton, Dept. of Biological Sciences, Univ. of Maine, Orono, ME 04469. Winter limitation of migratory bird populations is increasingly supported by empirical studies that also suggest consequences that carry-over to subsequent seasons. Variation in food availability is the preferred explanation for winter limitation, but the ecological mechanisms are not well understood. We used plot level manipulation and annual variation in food availability to determine the direct role of food in limiting the physiological body condition of individual Ovenbirds in Jamaica. In each of three years we maintained replicate plots of food supplementation, reduction, and control in a thorn-scrub habitat. Manipulations successfully altered food availability over a 5-6 week period during the naturally stressful Caribbean dry-season. Annual variation in the severity of the dry-season resulted in lower pre-manipulation food availability in each successive year, creating a natural experiment in parallel with manipulations. Sex and age-classes of Ovenbirds did not respond differentially in terms of body condition to either food manipulation or natural variation in environmental conditions, suggesting that this population is not structured by strong winter dominance relationships. Ovenbird body mass, fat, and pectoralis shape co-varied in a predictable linear fashion, and when controlled for pre-manipulation values, were positively and linearly related to manipulated and naturally varying food availability. Feather re-growth rates were linearly responsive to food manipulation in the relatively dry second year of study. Winter levels of hematocrit were negatively related to food availability, suggesting food reduced individuals are not able to maintain hydration levels. Ovenbirds' body condition was thus affected by variation in food availability as demonstrated by relationships with manipulated and naturally varying environmental conditions. Variation in food availability can influence the body condition of migratory birds independently of other habitat features, supporting the view that winter population limitation is driven by food availability. Poster
- 15 **DEALING WITH PSEUDOREPLICATION IN APLOMADO FALCON NEST PRODUCTIVITY DATA BY USING GENERALIZED LINEAR MIXED MODELS.** \***JESSI L. BROWN**, Peregrine Fund, Boise, ID 83709; Michael W. Collopy, Dept. of Natural Resources & Env. Sci., Univ. of Nevada-Reno, Reno, NV 89512; Erin J. Gott and Paul W. Juergens, Peregrine Fund, Boise, ID 83709. Factors influencing nesting productivity are of particular interest when managing vulnerable, recovering, or reintroduced populations. Studies of fecundity indicators, such as nest survival or nesting productivity, often treat repeated observations of the same individuals or territories as independent samples, even though the observations are not statistically independent (pseudo-replication). Typical linear or multiple linear regression techniques are therefore inappropriate. As a preliminary investigation into the factors influencing breeding success in a reintroduced population of Aplomado Falcons in south Texas, we examined factors influencing the number of chicks fledged/nesting attempt (0-3, mean 1.24) from a sample of 96 nests found in 36 territories between 2002 and 2004. We analyzed the data using mixed model regression with S-Plus software, allowing for both fixed and random effects. Because the response variable (number of chicks produced) was not a continuous variable, we used generalized linear mixed models with a Poisson error distribution and log link (Poisson log-linear mixed models). Comparisons of AIC values for various biologically plausible models showed that productivity was partially explained by territory (due to the detection of a significant random effect of territory) but one year's observation did not directly predict the following year's observation (no serial autocorrelation). Nest height was the only significant fixed effect. Although our regression results here do not reveal any unexpected trends, programming statistically rigorous mixed models was reasonably straightforward and allowed us to consider more biologically interesting hypotheses, including temporal autocorrelation and interactions between territory and other variables. Poster
- 16 **CONSERVATION OF SOUTHWESTERN WILLOW FLYCATCHER: HOME RANGE AND HABITAT USE BY AN ENDANGERED BIRD.** \***SUZANNE N. CARDINAL**, Dept of Biology/USGS-CPRS Northern Arizona University, Flagstaff, AZ 86011; Eben. H. Paxton, USGS-CPRS Southwest Biological Science Center, Flagstaff, AZ 86011; Tad C. Theimer, Dept of Biology, Northern Arizona University, Flagstaff, AZ 86011. Conservation and management of any species requires information on habitat preferences, movement, and size of area used. We conducted a radio telemetry study on the endangered Southwestern Willow Flycatcher in central Arizona to document home range and habitat use of males from their arrival on the breeding grounds through the post-breeding period. In both 2003 and 2004, home range sizes changed significantly over the pre-nesting, nesting and post-nesting periods ( $n=23$ ,  $Chi-square=11.54$ ,  $P=0.003$ ) with large variation in home range size (0.01 – 360.05 ha). Pre-nesting birds ( $n=6$ ) showed high variability in home range size (0.27-65.44 ha), nesting birds ( $n=13$ ) consistently had home ranges under 1 ha (0.10-0.97 ha), and post-nesting birds ( $n=4$ ) dramatically increased the area used (3.91-360.05 ha). In contrast to a telemetry study of the non-endangered subspecies in central Utah, we found habitat use to be restricted to the riparian floodplain with birds preferring mature habitat patches, and we found little indication for preferential use of native or exotic vegetation types. Our data indicate that 1) home range sizes fluctuate significantly through the season, 2) post-nesting movements may greatly increase the area that birds use, 3) there is little use of non-riparian habitats at our study site, and 4) there is little support for preferential use of exotic or native habitats within mature riparian vegetation zones. S 1100-1115

- 17 EFFECTS OF GAME MANAGEMENT PRACTICES ON THE AVIFAUNAL ABUNDANCE OF TWO LOUISIANA WILDLIFE MANAGEMENT AREAS. \***AMANDA CARROLL**, Dept. Biology, Univ. of Louisiana, Monroe, LA 71209; Kim Marie Tolson, Univ. of Louisiana, Monroe, LA 71209. Ouachita Wildlife Management Area (OWMA) and Russell Sage Wildlife Management Areas (RSWMA) are two state-owned lands that are primarily managed for game species through various forest management techniques. Because breeding birds that migrate from the tropics to North America are suffering significant declines, land managers have recognized the need to implement management strategies for non-game species. Data on the avian richness and abundance, as well as the effects of various silvicultural practices on the avian community, are lacking on these two bottomland hardwood forested habitats. Breeding Bird Surveys (BBS) were conducted on a total of 30 transects (OWMA=17, RSWMA=13) from April through early July of 2003 and 2004. A total of 8,000 breeding birds were detected over the course of the study generating a species richness of 37 different birds. The avian communities between the two WMAs were found to be relatively similar. Sorenson's Similarity Coefficient yielded a value of 0.913. Relative abundance was calculated for each species at each point along all transects. Analysis of variance concluded no significance ( $p < 0.05$ ) between the number of individual birds and the number of species between each treatment ( $n=4$ ) on RSWMA. However, significance was found on both the number of individuals and the number of species between the nine treatments on OWMA. Duncan's Multiple Range Test indicated that similar treatments on OWMA had no differences between the numbers of individuals or the numbers of species. Those treatments that were not similar did show differences in these numbers. Results conclude that the various forest management practices conducted on these state-owned lands have an effect on not only the abundance of each species but also the diversity of species found within each WMA. This study was supported by funds provided by the Louisiana Department of Wildlife & Fisheries (LDWF) and the United States Fish & Wildlife Service (USFWS), Division of Federal Aid through the State Wildlife Grants Program. Poster
- 18 HABITAT CHARACTERISTICS OF AMERICAN AVOCET AND BLACK-NECKED STILT NURSERIES. **JENNIFER CARY**, Dept. Biology, Austin College, Sherman, TX 75090; John F. Cavitt, Dept. Zoology, Weber State Univ., Ogden, UT 84408. The habitat characteristics of American Avocet and Black-necked Stilt nursery sites were determined in order to identify critical habitat in need of conservation due to the continued expansion and overpopulation of cities near the Great Salt Lake. This study was conducted at Bear River Migratory Bird Refuge (BRMBR) and Farmington Bay Wildlife Management Area (FBWMA), two sites consisting of a series of man-made dikes enclosing large sections of mudflats and marshes. We called areas where young and adults were observed nursery sites. At these "use" sites, young and adults were counted and regressed on components of the habitat: percent ground coverage, water coverage, and vegetation density and height. We also compared these use sites to randomly located sites, 50 m away, where no birds were observed. Even after lumping BRMBR and FBWMA together ( $p > 0.05$ ), we were unable to detect a significant difference in the habitat characteristics between use and nonuse sites ( $p > 0.05$ ). We classified young into two categories: age 1 chicks were small with various amounts of down and age 2 chicks were larger with full adult coloration. We did find when young were at age 1, stilt parents chose habitats that contained high water coverage ( $p < 0.05$ ). In general, age 1 young of both species were found in areas with large amounts of pickleweed ( $p < 0.05$ ). Our results also showed that avocet adults preferred habitats with vegetation other than bulrush and pickleweed ( $p < 0.05$ ), but stilt adults were located in areas with large percentages of water coverage ( $p < 0.05$ ). Adults of both species preferred habitats with various types of vegetation ( $p < 0.05$ ) and large percentages of bare ground ( $p < 0.05$ ). Consequently, our study showed that conservation of marshy habitats, with high percentages of water and pickleweed is vital to American Avocet and Black-necked Stilt's reproductive success. Poster
- 19 DIETARY RESPONSE OF THE ELEGANT TERN TO CHANGING OCEAN CONDITIONS AND PREY POPULATIONS IN SOUTHERN CALIFORNIA. \***KELLY CONNELL** and Michael Horn, California State University, Fullerton, CA 92834. We compared the diets of the Elegant Tern at three nesting sites in southern California in 2004 to help determine whether ocean conditions have shifted from a warm to a cool regime since 1999 and therefore whether this abundant seabird can be used as an indicator of oceanographic regime changes. Previous studies have shown that the northern anchovy is a major prey species for this tern, but that during warmer years, as in the mid-1990s, the Pacific sardine can become a more important prey species than the anchovy. Specifically, if the ocean is now in a cool regime, we expected a higher anchovy to sardine ratio in this tern's diet at all three sites, but more pronounced at the two more northerly locations (Los Angeles Harbor and Bolsa Chica Ecological Reserve). We also expected the Elegant Tern to have a broader diet at the more southerly site (San Diego Salt Works) because of a greater subtropical influence. We assessed diets by identifying fish dropped by the birds at the colonies or regurgitated by the young during parent-chick feeding encounters at the three sites. The anchovy to sardine ratios in the samples from Los Angeles Harbor and Bolsa Chica were, as hypothesized, significantly larger than at the San Diego site. Prey composition, but not prey diversity, also differed significantly among the three sites. Based on an index of the Pacific Decadal Oscillation (PDO), dietary species composition from 1993 to 2004 at Bolsa Chica, the best studied site, differed significantly between years of positive (cooler) and negative (warmer) PDO conditions. Our work to date shows apparent influences of climate on the prey availability and Elegant Tern diet in the region, but we are continuing our analysis to provide a more resolved picture. R 1130-1145

- 20 TRIVIAL CHANGES AND FEEDING RANGES: HOW SLIGHT PHYSIOGNOMIC ADJUSTMENTS OF FIELD MARGIN HABITAT MAY ELIMINATE 'DEAD FORAGE ZONES' IN ADJACENT CROP FIELDS. **\*ROSS CONOVER** and Eric Linder, Dept. Biological Sciences, Mississippi State University, Mississippi State, Mississippi 39762. The Mississippi Alluvial Valley (MAV) provides wintering habitat for seventeen grassland emberizids, six of which are species of conservation concern in winter. The waste grain of MAV farm fields is likely a principal forage resource for these emberizids; however, many species' cover-dependence limits their ability to exploit this resource. Recently, herbaceous borders that abut field-margin wood lines have proliferated throughout the MAV to improve wildlife habitat along field-wood line edge habitat. Our previous research on wintering avian communities suggests wintering sparrows more readily forage in crop fields adjacent to wide-bordered margins than non- or narrow-bordered field margins. This response may potentially generate a 20-50 m 'dead forage zone' that flanks inadequately bordered margins. In winter, the perpetually diminishing seed resource is a primary limiting factor of granivorous bird survival; hence, their ability to access such a resource is paramount. This study investigated the foraging patterns of cover-dependent and independent sparrows in crop fields adjacent to margins with borders of differing widths. Foraging behavior of sparrows was tested among border widths by establishing seed plots at varying distances into adjacent fields. Plots were randomly baited and videoed throughout February 2005 to record species' occurrence, visit frequency, flock size, and visit duration at each plot. The relationship between plot location and observed variables will be analyzed to identify an optimal border width. Preliminary evidence has disclosed the ineffectiveness of field margins with <20 m wide herbaceous border. The recognition of an optimal border width will pioneer the standardization of proper field border physiognomic management protocols, thereby assuring suitable wildlife habitat. F 1615-1630
- 21 THERMOREGULATORY BENEFITS OF FEEDING IN HOUSE SPARROWS. **SHELDON J. COOPER** and Jeremy R. Arens, Dept. Biology & Microbiology, Univ. Wisconsin Oshkosh, Oshkosh, WI 54901. The heat increment of feeding (HIF) is the increase in metabolic rate following ingestion of a meal. Generally it is assumed that HIF adds to the total energy costs of an animal. However, HIF may substitute for thermoregulatory costs in small birds. We measured the effect of ambient temperature on HIF and substitution in House Sparrows. We measured metabolism in House Sparrows that were either fasted (post-absorptive) or fed. We compared the metabolic rates of fed vs. fasted birds within the thermo-neutral zone and at temperatures below the lower critical temperature. Metabolism was measured as oxygen consumption ( $VO_2$ ) using open-circuit respirometry. By comparing  $VO_2$  of fed and fasted birds at a thermo-neutral temperature (30°C) we could calculate the apparent HIF in House Sparrows. For example, fed birds had a 15% higher mean  $VO_2$  than fasted birds at 30°C. At colder temperatures, fed birds had only a 4-7% higher  $VO_2$  than fasted birds. These results suggest that feeding may help substitute for thermoregulation in House Sparrows. R 1600-1615
- 22 THE RELATIVE WEIGHTS OF NEW ZEALAND PASSERINE EGGS. **JAMES B. CUNNINGHAM**, Dept. Natural Sciences and Mathematics, Dominican University of California, San Rafael, CA 94901. Egg weight is a positive function of body weight in a large number of bird species. In this study I examined the relationship of egg weight to female weight in 11 endemic New Zealand passerines. The log of egg weight when regressed against the log of female weight resulted in a positive linear relationship. The line for New Zealand species was compared to one for overseas passerines using ANOCOVA. The 11 New Zealand passerines studied laid relatively large eggs. Production of large eggs may be a response to certain ecological and demographic features common to many New Zealand birds. F 1400-1415
- 23 POPULATION DECLINES OF NEARCTIC-NEOTROPICAL MIGRATORY LANDBIRDS APPEAR TO BE DRIVEN PRIMARILY BY PROCESSES THAT AFFECT OVERWINTERING SITE PERSISTENCE AND ANNUAL SURVIVAL. **DAVID F. DeSANTE**, Danielle R. Kaschube, and James F. Saracco, The Institute for Bird Populations, Point Reyes Station, CA 94956-1346. Many species of Nearctic-Neotropical migratory landbirds (NTMBs) have declined over the past three decades. In response to these declines, major conservation efforts such as Partners in Flight (PIF), the North American Bird Conservation Initiative, and the Neotropical Migratory Bird Conservation Act have been established and funded. Despite these efforts, conservation of these species has largely been ineffective, at least at a range-wide scale. Indeed, for 31 species of landbirds that winter primarily in Mexico, Central America, and the Caribbean and that had significant survey-wide BBS population declines during the 22-year period, 1980-2002, BBS trends during the eleven years subsequent to the establishment of PIF (1991-2002; mean -2.04% per year) were not significantly different (pair-wise *t*-test:  $t=0.23$ ,  $df=30$ ,  $P=0.820$ ) from those during the eleven years prior to the establishment of PIF (1980-1991; mean -1.94% per year), with 16 of the 31 species showing more negative trends during the later period. We regressed long-term (1966-2002) survey-wide BBS population trends on program-wide estimates of monthly over-wintering apparent survival (site persistence) from 63 MoSI (Monitoreo de Sobrevivencia Invernal) stations operated across Mexico, Central America, and the Caribbean during the winter of 2003-04 for the 12 species of forest-wintering NTMBs for which we could obtain such estimates, and found a very strong positive relationship ( $R^2=0.86$ ;  $P<0.0001$ ). This suggests that processes operating on the wintering grounds of these species are driving their population trends, presumably through reduced annual survival. To address this hypothesis, we regressed 1992-2001 BBS survey-wide population trends on 1992-2001 time-constant program-wide estimates of annual adult survival from MAPS (Monitoring Avian Productivity and Survivorship) for 31 species of Neotropical-wintering wood warblers, and again found a strong positive relationship ( $R^2=0.27$ ;  $P=0.004$ ). We suggest that intensified efforts to identify factors affecting NTMB winter site persistence, and thus winter habitat quality, will be essential for the conservation of these species. F 1445-1500
- 24 A HABITAT PREDICTABILITY MODEL FOR GOLDEN EAGLES ON PRIVATE TIMBERLANDS IN COASTAL NORTHERN CALIFORNIA. **DANIEL R. DILL**, Sal J. Chinnici, and David Bigger Ph.D., SCOPAC, Scotia, CA 95565. Distribution and habitat use of Golden Eagles is poorly understood on the North Coast of California, but it is known that Golden Eagles need large amounts of open land to forage and ensure reproductive success. The historical rarity of Golden Eagles in North Coastal California may be linked to the lack of foraging habitat. Given this uncertainty, state agency biologists have requested extensive surveys for this species on 88,087 hectares of coastal redwood and Douglas-fir stands, and prairies owned by PALCO. Beginning in 2002, we conducted extensive surveys for Golden Eagle nests. Prior to these surveys, only 2 nests were recorded in Humboldt County, CA. We located an additional 12 historic, active, or occupied nests. Additionally, these surveys documented large areas with no eagle sightings, S 1130-1145

suggesting that large portions of PALCO's forested lands may be unsuitable habitat for nesting eagles. To better understand Golden Eagle habitat use in North Coastal California, we examined the habitat characteristics surrounding the nests of this species at the landscape scale using Geographic Information System technology. We found a strong and consistent pattern in the abundance of foraging habitat located within a 3-km radius core area around known Golden Eagle nests. We also found that sites with the most foraging habitat were more likely to have nesting eagles. With this information, our land managers are developing a more cost effective and refined protection strategy for Golden Eagles in North Coastal California.

- 25 ECOLOGY AND MANAGEMENT OF NORTHERN SPOTTED OWLS ON COMMERCIAL TIMBERLANDS IN COASTAL NORTHERN CALIFORNIA. **LOWELL DILLER**, Keith Hamm, and Joel Thompson, Green Diamond Resource Co, Korbelt, CA 95550. Studies of northern spotted owls were initiated in 1989 on lands owned by Green Diamond Resource Company (formerly Simpson Timber Company) in coastal northern California. Since then, a Habitat Conservation Plan (HCP) was developed for the species in 1992, two masters studies were completed in 1993 and 1997, long-term demography and density studies were initiated in 1990 and will continue throughout the term of the HCP, and a telemetry study was conducted from 1998-2000. During the course of these studies, 843 nests have been located, 1472 owls have been captured and banded, and movement and foraging data have been obtained using night vision scopes and telemetry on 35 owls. Despite extensive past and current timber harvesting activities, portions of the study area have high densities of spotted owls. Landscapes with the highest densities of spotted owls are a mosaic of mature second growth and recently harvested stands. The owl population was relatively stable throughout the early 1990's, but has declined in recent years. Direct observations of spotted owls at night indicated that they foraged in recent harvest units, but the greatest amount of time was spent in 10-20 and >60 year old stands. We are currently in the process of developing a nesting resource selection model that will be used to project future habitat availability for spotted owls in this managed landscape. Our current knowledge of the ecology of spotted owls is sufficient to provide a high level of confidence in being able to provide for the future habitat needs of the species on managed lands. However, the invasion of barred owls and West Nile Virus into northern California, create unknown factors in the long-term persistence of spotted owls. S 1130-1145
- 26 MODELING AVIAN NEST SURVIVAL IN PROGRAM MARK. **STEPHEN J. DINSMORE**, Mississippi State University, Dept. of Wildlife and Fisheries, Box 9690, Mississippi State, MS 39762. Ornithologists have long been interested in measures of the reproductive success of birds. Traditional estimates of apparent nesting success were overshadowed by widespread acceptance of the Mayfield approach by the 1970s. However, despite recent progress in the development of new approaches to modeling nest survival, the Mayfield estimator is still widely used. The Mayfield approach, while intuitive and easy to compute, has several disadvantages that limit its use in investigating complex questions of avian nest survival. Here, I discuss the use of one of these recent developments – modeling nest survival using the nest survival model in Program MARK. Program MARK offers a flexible and user-friendly interface for building and evaluating competing models of nest survival. Using Mountain Plover nesting data, I contrast estimates of nest survival generated in MARK with traditional Mayfield estimates. With this 10-year dataset, I modeled plover daily nest survival rates as a function of several factors of interest (sex of the incubating adult, the daily age of the nest, year, linear and quadratic time trends within years, and two daily weather covariates) to obtain more biologically meaningful estimates of nesting success. In contrast to the Mayfield estimate, estimates from Program MARK allowed multiple biological factors affecting nesting success to be more thoroughly explored and provided a deeper insight into the nesting ecology of this species. W 1130-1200
- 27 THE EFFECTS OF OFF HIGHWAY VEHICLES ON THE NORTHERN GOSHAWK. **JEFFREY R. DUNK**, John Keane, Jennifer van Gelder, Taro Narahashi, Nathan Hostetter, Stacey Vigallon, Hattie Oswald, Ann Bowles, and Tina Yack, Redwood Sciences Laboratory, Arcata, CA 95521. We are currently examining the effects of off highway vehicles (OHV) on Northern Goshawks in the Plumas National Forest, northeastern California. California is experiencing increased recreational demands including increased OHV use on public lands, yet little study has been devoted to impacts OHV may have on wildlife and habitat. Herein, we describe the methods we currently employ to test hypotheses about potential OHV impacts on goshawks. Pairing control territories with experimental territories that are subjected to OHV treatments, our approach is three-fold: (1) to examine reproductive success and fledgling survival, (2) to obtain detailed behavioral observations of goshawk response to OHV, including movements and vocalizations, (3) to evaluate nest-site selection relative to soundscapes around nests using audio recordings and sound propagation models. To detect occupied territories, we conduct dawn chorus surveys and silent nest searches within historical territories. Control and treatment territories are subsequently paired based on habitat quality, current and historical human use, and nest area soundscapes. During the course of the breeding season we observe goshawks at the nest and monitor radio-tagged fledglings to obtain data on reproductive success, fledgling survival, and goshawk behavior. To obtain soundscapes at active nests, we utilize digital audio recording systems while conducting direct nest observations. This allows us to sample typical ambient sound, OHV sound level, and goshawk vocalizations in order to evaluate goshawk response to particular sound intensities/frequencies. At the conclusion of this 4-year study, we hope to provide information that will promote scientifically informed decision-making about OHV management relevant to goshawks. Poster
- 28 SPATIAL AND TEMPORAL MIGRATION PATTERNS OF WILSON'S WARBLER IN THE SOUTHWEST REVEALED BY STABLE ISOTOPES. **\*KRISTINA L. ECTON**, Dept. of Biological Sciences, Northern Arizona University, Flagstaff, AZ 86011; Charles van Riper III, USGS Southwest Biological Science Center, Sonoran Desert Research Station, University of Arizona, Tucson, AZ 85721; Tad C. Theimer, Dept. of Biological Sciences, Northern Arizona University, Flagstaff, AZ 86011. Migration represents a critical time period when birds can be at their physiological limits and may suffer greatest annual mortality. Determining how migration is linked to the breeding period and the degree of population segregation during migration is critical to understanding long-term population trends of Neotropical migrant birds. We used stable hydrogen isotopes (dD) to identify the breeding location of Wilson's Warblers migrating through 5 sites in southern California and Arizona during the springs of 2003 and 2004. A significant, positive correlation between stable hydrogen isotope values of feathers and the local precipitation at sites where feathers were collected across Wilson's Warbler's western breeding range indicated that stable hydrogen F 1615-1630

isotopes are a good predictor of breeding location. At all 5 sites where migrating warblers were captured, we found a significant negative relationship between the date when warblers passed through the sampling station and  $\delta D$  values of their feathers. These data indicated that warblers that bred the previous season at southern latitudes migrated through the migration stations earlier than warblers that had previously bred at more northern latitudes. This 'leapfrog' pattern was consistent at multiple sites and across both years of the study. Mean  $\delta D$  values became more negative at sampling stations from west to east, indicating that birds passing through each station represented a specific regional subset of the entire Wilson's Warblers western breeding range. These data suggest that habitat alteration at specific areas across the west-east expanse of the migratory route could differentially impact warblers at different breeding areas. This migration information is critical for management of Neotropical migrants, especially in light of the rapid changes that are presently occurring over the southwestern landscape.

- 29 **WHEN DOES THE MARKOV CHAIN FRAMEWORK RESULT IN BETTER NEST SURVIVAL ESTIMATES?** **MATTHEW A. ETTERSON**, U.S. Environmental Protection Agency, Duluth, MN 55804. I developed a Markov chain nest-survival model to study potential biases in overall probabilities of both failure and success. The basic model is equivalent to many previous estimators, including Mayfield's, when similar assumptions are imposed (*i.e.* daily nest-visits, within and among nest homogeneity of survival rates, etc.). There are currently two potential advantages to using the Mayfield Markov chain. First, it can be used to estimate daily mortality probabilities due to different sources (*e.g.* weather, nest-predation, inter-specific nest destruction), when the actual causes for nest-failure are known. Second, the model incorporates joint probability distributions of transition (hatching or fledging) and age to correct for bias that may occur when the dates of hatching and fledging are unknown. I illustrate both functions using data on Loggerhead Shrike nest survival in Oklahoma, data on Wood Thrush nest-survival in Virginia, and simulated data. For Loggerhead Shrikes I estimate daily probabilities of failure due to weather and due to nest-predation. For Wood Thrush I estimate daily probability of nest predation and test for heterogeneity in daily survival rate (no evidence). I then show how both continuous and categorical covariates may be used to test hypotheses, using AIC and related measures. For Loggerhead Shrikes, the best model included yearly variation in failure due to weather, but constant predation rates. For Wood Thrush, the best models included both forest patch size (large vs. small) and distance to the edge of the forest (m). Simulated data suggest that including transition probabilities in nest survival estimation can help reduce bias in estimated daily survival rates. However, including the exact date on which a transition occurred reduces bias considerably more than the use of transition probabilities. For unbiased estimates of overall probability of success, accurate knowledge of the hatching and fledging distributions is essential, but this may require several hundred or more nests. W 1300-1320
- 30 **A MULTIGENE PHYLOGENY OF GRUES.** **MATTHEW G. FAIN**, Dept. Biology, University of New Mexico, Albuquerque, NM 87131; Peter Houde, Dept. Biology, New Mexico State University, Las Cruces, NM 88003; Carey Krajewski, Dept. Zoology, Southern Illinois University Carbondale, Carbondale, IL 62901. Opinions on the systematics of the order Gruiformes have been as diverse as the families classified within. Despite ongoing debate over monophyly of the order and relationships among the various members, recent systematic work has converged on monophyly of a "core" group of five families classified in the suborder Grues: the rails (Rallidae), the cranes (Gruidae), the Limpkin (Aramididae), the trumpeters (Psophiidae), and the finfoots (Heliornithidae). We present DNA sequence data from the mitochondrial cytochrome b, 12S rRNA, Valine tRNA, and 16S rRNA, and from two nuclear introns: intron seven of  $\beta$ -fibrinogen and intron five of alcohol dehydrogenase I, to test previous hypotheses of interfamilial phylogenetic relationships within Grues, including the monophyly and relationships of the enigmatic family Heliornithidae. Separate and combined analyses of these gene sequences confirm monophyly of all the families, including all three species of Heliornithidae, and the combined data produce a well-resolved topology for all interfamilial relationships with the exception of the Psophiidae. Bayesian "relaxed-clock" dating methods suggest that the divergence of heliornithids from rails is likely Eocene or younger, suggesting that the present pantropical distribution of the three finfoot species is a result of early- to mid-Tertiary dispersal. S 1400-1415
- 31 **INFLUENCE OF POST-FIRE TIMBER HARVEST ON BLACK-BACKED WOODPECKER NEST SURVIVAL.** **\*CHRIS FORRISTAL**, Dept. Ecology, Montana State Univ., Bozeman, MT 59717; Victoria Saab, USFS, Rocky Mt. Research Station, Bozeman, MT 59717. Post-fire timber harvest practices on public lands are a highly contentious issue in the western United States. Harvest of burned trees impacts a number of species, particularly those specialized for using post-wildfire habitats. We are currently assessing the hypothesis that post-fire salvage logging negatively influences black-backed woodpecker nest survival, productivity, and distribution within burned, mixed conifer forests of south-central Oregon. This research will attempt to quantify the effects of salvage logging on these woodpeckers in multiple treatment (harvested) and control (un-harvested) plots of various sizes. Black-backed woodpecker nesting attributes are being examined for four years immediately following a stand-replacement fire. Plots are surveyed and monitored two years pre-logging (2003-04) and two years post-logging (2005-06). Black-backed reproductive attributes will be analyzed in respect to logged or un-logged sites at multiple spatial scales. We are investigating the following predictions: (1) nest density, survival, and productivity will be lower in harvested vs. un-logged control sites; (2) nests will be located away from forest edges created by salvage logging and the interface with green, unburned forest; and (3) nest density and productivity will be higher in larger vs. smaller burned patches. A total of 101 black-backed nests were monitored in the first two years post-fire, with the number of nests doubling the second year. Similar to previous studies, our preliminary results indicate that black-backed woodpeckers exhibit high nest survival, and that they select nest sites with higher snag densities than non-nest random sites. Data from the current field season, the first since salvage logging, should provide insight on the response of black-backed woodpeckers to this timber management activity. Upon completion, this project will supply agencies and managers with scientific data regarding post-fire habitat conservation for a sensitive woodpecker species. Poster
- 32 **WHY HABITAT QUALITY MATTERS: LINKING FITNESS AND THE CONSEQUENCES OF HABITAT SELECTION BY NORTHERN SPOTTED OWLS IN CALIFORNIA.** **ALAN B. FRANKLIN**, Colorado Cooperative Fish & Wildlife Research Unit, Colorado State University, Fort Collins, CO 80523. Habitat quality, as defined by some measure of fitness, is a more useful metric in understanding the consequences of individual use of a given area than just categorical habitat descriptions where individuals occur. Here, I argue the merits of understanding patterns and R 1345-1415

mechanisms in habitat quality based on linkages with life-history traits, and ultimately, fitness. I use the history of habitat studies on Northern Spotted Owls to illustrate the progression from associations with single vegetation types to linking life-history traits and a measure of fitness with more complex associations of landscape features. This information has provided insights into the consequences of habitat choices made by spotted owls and some of the potential mechanisms as to why these choices result in higher individual fitness. However, the behavioral mechanisms in how and why certain areas are chosen by Spotted Owls still remain unknown. In presenting this example, I also attempt to illustrate why patterns in simple habitat associations or linking habitat quality with a single life-history trait can be misleading and possibly lead to inappropriate inferences about habitat associations. I also present one analytical approach found to be useful in estimating habitat quality based on habitat fitness potential in spotted owls. This approach may have utility in estimating habitat quality in other territorial organisms.

- 33 THE LONG AND SHORT OF AMAKIHI BILL EVOLUTION IN HAWAII. **LEONARD FREED**, Dept. Zoology, Univ. Hawaii, Honolulu, HI 96822; Rebecca Cann, Dept. Cell and Molecular Biology, Univ. Hawaii, Honolulu, HI 96822; Matthew Medeiros, Dept. Zoology, Univ. Hawaii, Honolulu, HI 96822. Multiple evolutionary reversals over geological time are difficult to interpret because continuity of gene pools is generally unknown. We document that the Amakihi, a generalist insectivorous and nectarivorous Hawaiian Honeycreeper (Drepanidinae), has evolved shorter and longer bills multiple times on different islands. Phylogenetic analysis of Cyt B mtDNA sequences shows genetic continuity of the Amakihi species and subspecies along the main island chain from Kauai to the Island of Hawaii. The sequence of bill length runs from being longest on Kauai (oldest island), next longest on Maui (third oldest), with the shortest bill lengths on Oahu (second oldest) and Hawaii (fourth oldest). This indicates a pattern of - long to short to long to short - in phylogenetic sequence. Given the similarity of habitats on each of these islands, and the generalist nature of the Amakihi bill, the changes in bill length are unlikely due to novel foraging substrates or arthropods. Alternatively, the changes are associated with other species of honeycreepers. The long Kauai Amakihi bill is associated with the shorter bill of the Anianiau, a closely related bird endemic to Kauai. The shorter Oahu Amakihi bill lies between the bills of the Kauai Amakihi and the Anianiau, suggesting that the long Kauai Amakihi bill is based on character displacement. The longer Maui (and Molokai) bills are associated with the Akohekohe on these islands. The dominant nectarivorous Akohekohe would force these Amakihi to be more insectivorous. The short Hawaii Amakihi bill is associated with the much longer bill of the Greater Amakihi on the Island of Hawaii. The ancestral Maui bill is intermediate, again suggesting that character displacement may have played a role. S 1415-1430
- 34 BATTLE OF THE LILLIPUTIANS: INTERACTIONS BETWEEN CUP NESTING SONGBIRDS AND THEIR PREDATORS IN A PONDEROSA PINE FOREST. **T. LUKE GEORGE**, Department of Wildlife, Humboldt State University, Arcata, CA 95521; Steve Zack, Wildlife Conservation Society, 219 SW Stark Street, Suite 200, Portland, OR 97204. We examined the interactions between Dusky Flycatchers and Dark-eyed Juncos with their nest predators in a ponderosa pine forest in northeastern California using video cameras. Scuriid rodents were the principal nest predators of both species accounting for 60 and 65% of the observed nest predation events for Dusky Flycatchers and Dark-eyed Juncos, respectively. From 1998-2004, we monitored the nesting success of both species and the abundance of sciurids on the same plots. Nesting success of both species was negatively related to sciurid abundance over the seven years. We saw no evidence of an increased raptor predation on nests in low mammal years as has been suggested for one location in the eastern United States. Dusky Flycatchers vigorously defended their nests from sciurids and we observed one case where the adults were successful at driving a chipmunk away from a nest. Dark-eyed Juncos dove less and did not approach as closely as Dusky Flycatchers when defending their nests from sciurids. Neither species was observed defending their nests from hawks, nocturnal predators, or snakes. These observations suggest that both species attempt to defend their nests from their principal nest predators and that they are sometimes successful in dissuading predators. R 1645-1700
- 35 HABITAT STRUCTURE, DIET AND POPULATION DENSITY OF BURROWING OWL IN THE MEXICAN PLAINS, IN GALEANA, NUEVO LEÓN, MÉXICO. **JOSE GONZALEZ**, Gabriel Ruiz, and Irene Ruvalcaba, Dept. de Vertebrados, Universidad Autónoma de Nuevo León, Apdo. P. 25-F, Ciudad Universitaria, San Nicolás de los Garza, Nuevo León, México 66450; Miguel Cruz and Armando Jiménez, Pronatura Noreste, A.C. Loma larga 235, Col. Loma Larga, Nuevo León, Mexico 64710. Burrowing Owl is a North American vulnerable species, typical of grasslands, which main causes of population declines are habitat loss and pesticides effects. For habitat characterization, there were randomly selected 19 1x10 m quadrants. Thirty-three plant species were identified. Values for abundance, density, relative density, frequency, relative frequency, covering, and importance value were calculated for each species. About diet, 241 pellets were collected during two winter periods (2002, 2003 and 2004). There were significant differences in pellet contents between years ( $g=27$ ,  $\alpha=0.05$ ). Population density was obtained for three natural protected areas during the winter period 2004-2005: "La Soledad"(0.046/ha), "La Hediondilla" (0.016/ha) and "La Trinidad" (0.018/ha). F 1145-1200
- 36 TIME-SPECIFIC VARIATION IN PASSERINE NEST SURVIVAL: NEW INSIGHTS FOR OLD QUESTIONS? **TODD A. GRANT**, United States Fish and Wildlife Service, J. Clark Salyer National Wildlife Refuge, 681 Salyer Road, Upham, ND 58789; Terry L. Shaffer, United States Geological Survey, Northern Prairie Wildlife Research Center, 8711 37th Street SE, Jamestown ND 58401; Stephen K. Davis, Canadian Wildlife Service, 300-2365 Albert Street, Regina, Saskatchewan S4P 4K1, Canada. Nest survival likely varies with nest age and date, but until recently researchers had only limited tools to efficiently address these sources of variability. Beginning with Mayfield (1961), many researchers have averaged survival rates within time-specific categories (e.g. egg and nestling stages; early and late nesting dates). However, Mayfield's estimator assumes constant survival within categories, and violations of this assumption can lead to biased estimates. We used the logistic-exposure method to examine nest survival as a function of nest age and date for Clay-colored Sparrows and Vesper Sparrows breeding in north-central North Dakota. Daily survival rates varied greatly with age and date, and patterns were more complex than previously reported using the Mayfield or similar constant-survival methods. Variation in survival with nest age and date suggests that traditional categorical averaging using constant-survival methods would have been inappropriate for this study; similar variation may bias results of other studies. Recently, we found similarly complex age- and date-specific survival patterns for additional grassland bird species breeding in the northern Great Plains. However, these patterns were not universal W 1340-1400

among species or habitats. We encourage researchers to consider models of nest survival that involve nest age and date as time-specific explanatory variables because these models can provide insights that are unavailable from averaged data. We have observed, in numerous analyses of songbird and duck nests, strong effects of age and date relative to variables of primary interest, such as habitat features or management treatments. Thus, it can be important to consider effects of age and date when examining effects of primary variables.

- 37 IS BRUSH FOR THE BIRDS?: THE ROLE OF UNDERSTORY VEGETATION IN MAINTAINING DIVERSITY IN MANAGED FORESTS. **JOAN HAGAR**, USGS - Forest & Rangeland Ecosystem Science Center, Corvallis, OR 97330; Kate Dugger, Department of Fish & Wildlife, Oregon State University, Corvallis, OR 97331; Ed Starkey, Forest & Rangeland Ecosystem Science Center, Corvallis, OR 97330. Under-story vegetation is an important but often overlooked component of habitat in western coniferous forests. We conducted an investigation to determine which plant species were important in supporting arthropod prey for forest birds, and how forest management may influence these food resources. We examined the relationships among bird abundance, availability of arthropod prey, and composition of under-story vegetation communities in forest stands representing a range of structural conditions in western Oregon. We used fecal analysis to describe the diet of Wilson's warblers as a representative of bird species that forage in the under-story of conifer forests, and compared the abundance of their arthropod prey among shrub species and silvicultural treatments. Tall, deciduous shrubs supported high abundances of arthropod prey, especially Lepidoptera larvae. We recommend promoting the growth and retention of these shrub species throughout forest stand development in order to maintain diversity of multiple taxa through associated food webs. Poster
- 38 GRASSLAND BIRD NEST SURVIVAL IN RESTORED AND REMNANT PRAIRIES IN NORTHWESTERN IOWA. \***EMBERE HALL**, Dept. Natural Resources, Iowa State Univ., Ames, IA 50011; Rolf Koford, USGS, Iowa Cooperative Fish and Wildlife Research Unit, Iowa State Univ., Ames, IA 50011. In the Midwest, less than 1% of the original tall-grass prairie remains. Agencies and land managers have responded to this habitat loss with land acquisition and grassland restoration programs. Grassland restorations in the Midwest, however, frequently consist of planting areas with a few species of grasses and forbs. While these plantings may restore some degree of ecological function, they often do not achieve the structural diversity of native prairies. In 2003 and 2004 we studied the effect of grassland restoration and the relative contribution of local and landscape metrics on grassland breeding birds in northwestern Iowa. We compared avian nest success estimates from 10 restored grassland sites to estimates from 6 remnant prairie sites to examine the impact of current restoration efforts on local bird productivity. Dickcissels, bobolinks, red-winged blackbirds and clay-colored sparrows nested in both habitat types. We used logistic-exposure models and AIC model selection to examine variation in daily survival rates. The best-supported models included nest age, nest location (ground vs. above-ground) and habitat type (restored grasslands vs. remnant prairies). Daily survival estimates decreased as the nest aged. Survival probabilities were higher in remnant prairie sites and in above-ground nests. Results from this study will help managers effectively restore landscapes crucial to declining grassland songbird populations. While land managers generally cannot change the size or spatial arrangement of habitat patches, they can control vegetation composition and structure within patches. S 1330-1345
- 39 POTENTIAL IMPACTS OF WEST NILE VIRUS ON SPOTTED OWL POPULATIONS. **TAMMY L. HAMER** and Alan B. Franklin, Colorado Cooperative Fish and Wildlife Research Station, Colorado State University, Fort Collins, CO 80523. West Nile virus (WNV) is a mosquito-borne flavivirus that was first introduced on the east coast of North America in 1999 and can cause serious disease in humans and wildlife, especially birds. By 2003, WNV had spread across North America and first appeared in southern California and by fall 2004 had spread into northern California. The arrival of WNV in northern California could have profound impacts on the extant bird communities, which are naive to the effects of WNV. Although the disease is known to cause mortality in avian species, the potential impacts of WNV on avian populations are largely unknown. In particular, there is evidence that owls may be particularly susceptible to WNV from both direct transmission by mosquitoes and indirect transmission from infected prey. Current long-term research on the population dynamics of two subspecies of spotted owls on 4 study areas in northern California offers a unique opportunity to provide insights on how the introduction of WNV affects avian population dynamics in different forest landscapes under different management regimes. These long-term studies on spotted owls have collected data on survival, fecundity, recruitment, and rates of population change from marked individuals for the past 10-20 years, which provides baseline values of population parameters prior to the introduction of WNV. Using estimates of population parameters from the ongoing spotted owl studies, we used simulation models to examine the potential effects of WNV on spotted owl populations under different disease impact scenarios. These different impact scenarios were based on current information of WNV impacts on avian populations and mosquito vector ecology. Under most scenarios, spotted owl populations declined dramatically. We anticipate that our models will be useful for predicting how WNV could affect spotted owl populations. In a broader sense, we believe this system has promise for predicting the effects of WNV and other introduced pathogens on wild avian populations. F 1400-1415
- 40 PATTERNS OF NECTAR AVAILABILITY AND HONEYCREEPER ABUNDANCE ACROSS AN ELEVATIONAL GRADIENT ON WINDWARD HAWAII. **PATRICK HART**, Bethany Woodworth, Katherine McClure, Kathryn Turner, Caleb Spiegel, Erik Tweed, Jaymi LeBrun, Katie Goodall, and Carlie Henneman, USGS-BRD, P.O. Box 44, Hawaii National Park, HI 96718. Ohia is the dominant tree species in Hawaiian forests and the principal nectar source for many Hawaiian bird species. Two nectarivorous honeycreepers, Apapane and liwi, are thought to make daily long-distance foraging flights in search of nectar in the non-breeding season. These movements may bring birds from high elevation forests into mid- or low-elevation forests where introduced diseases (avian malaria and pox) and vectors are common. We documented patterns of ohia nectar availability and nectarivore abundance at nine 1km<sup>2</sup> study areas located along an altitudinal gradient from 20-1800m on windward Hawaii from 2002 through 2004. Birds were surveyed monthly to estimate changes in density. We estimated nectar availability in ohia by counting flowers in random trees at all study sites monthly and measuring nectar flow rate and energy content. Ohia flower density peaked at all elevations in March and April of each year. Peaks in flower abundance were significantly greater at high and low elevations, but in the non-peak season flower availability was greatest at mid-elevation sites. Overall flower densities and nectar flow rates were greatest at low elevations, but few Apapane (and no liwi) were detected at low elevations. The disease outbreaks that have been reported in middle elevation forests in the fall are not associated R 1145-1200



with peaks in abundance of nectar feeding birds. Rather, the presence of ohia flowers primarily at middle elevations along the gradient during fall likely attracts some susceptible individuals from "disease free" areas. The flowering pattern of ohia is associated with Apapane movement to some extent, but the conditions that drive the disease system appear to vary with elevation and the composition of the bird community.

- 41 COMMUNICATING ORNITHOLOGICAL INFORMATION TO PROTECTED AREA MANAGERS AND THE PUBLIC THROUGH RESEARCH LEARNING CENTERS. **SALLIE J. HEJL**, Glacier National Park, West Glacier, MT 59936. S 1030-1045  
The Crown of the Continent Research Learning Center (CCRLC) in Glacier National Park is one of 12 research learning centers that were recently created by the National Park Service as part of the Natural Resource Challenge. Research learning centers have been developed to facilitate research efforts in the national parks, to promote the use of science in decision-making, and to provide research-related educational opportunities. The educational goals of the CCRLC include: translating the latest research into usable forms for park staff; providing research experiences for students, teachers, and the public; developing opportunities for teachers to use information on research in the park; translating the latest research into usable forms for the public; and supporting Glacier's research program. The CCRLC is translating research results on birds for park managers, interpreters, and the public through the creation of an interpretive trail on birds and fire ecology, a notebook on birds and fire ecology for interpreters, a workshop on the 2003 fires for park staff, and an interactive website on the natural and cultural history of Glacier National Park. In our effort to provide research experiences to the public, we are creating a citizen science program on Common Loons in Glacier. Participants will: (1) learn to identify Common Loons; (2) be introduced to the current state of knowledge about the distribution of loons in Glacier, loon breeding biology, the potential impacts of recreationists on loon population health, and management concerns for Common Loons at Glacier; and (3) be taught how to observe the birds to determine whether they are mated and have young. Volunteers will help us determine the number of adults, sub-adults, and juveniles on Glacier lakes, and the nesting success of the loons on a subset of lakes. The loon work will complement state and national efforts. In support of Glacier's research program, we have created a list of high priority research needs that is available on the web.
- 42 INFLUENCE OF HABITAT ON NEST SURVIVAL OF SNOWY AND WILSON'S PLOVERS IN TEXAS. \***SHARYN L. HOOD** and Stephen J. Dinsmore, Dept. Wildlife and Fisheries, Mississippi State Univ., Mississippi State, MS 39762. S 1345-1400  
The Snowy Plover and Wilson's Plover are two shorebird species of high conservation priority. Populations of both species are declining due to coastal habitat loss and degradation, and research that examines the effects of habitat features and other biological factors on nest survival is essential for effective conservation planning. Using the nest survival model in Program MARK, we modeled nest survival of Snowy and Wilson's Plovers in the lower Laguna Madre region of Texas during 2003-2004. We measured habitat characteristics surrounding each nest at three scales: 1) microhabitat (1 m<sup>2</sup> circle around nest), 2) macro habitat (within 25 m radius of nest), and 3) landscape (within 1 km radius of nest). These habitat measurements, along with the daily age of the nest, within-season temporal variation, and two daily weather covariates were incorporated into models to explain variation in daily nest survival. We compared apparent nest success estimates (Snowy Plover: 54% in 2003 and 31% in 2004, Wilson's Plover: 71% in 2003 and 65% in 2004) to estimates obtained from our model set. Our results demonstrate the use of habitat covariates in the nest survival model in Program MARK, and provide the first estimates of nest survival for Snowy and Wilson's Plovers using this method. These estimates also increase our understanding of the nesting ecology of these species, particularly the influence of habitat on nesting success, and will be useful for future conservation planning.
- 43 HOW CAN WE ESTIMATE EFFECTS OF HABITAT CONSERVATION ON MARBLED MURRELET POPULATIONS? **SCOTT HORTON**, Coll. Forest Res., Univ. Washington, and WA State Dept. Nat. Res., Forks, WA 98331. F 1030-1045  
Credible wildlife conservation programs are based on integrated understanding of population processes and mechanisms that link them to habitat or other environmental influences. Existing information provides the basis to link Marbled Murrelet populations to the amount and condition of forest nesting habitat: radar studies relate murrelet numbers to habitat area; radio-telemetry studies relate inland behavior with reproductive status; observational and experimental studies suggest mechanisms relating vital rates to habitat characteristics; and demographic data from murrelets and other alcids have been used to develop projection models for murrelet populations. I expanded a radar-based model predicting carrying capacity (K) and adapted an existing Leslie Matrix murrelet population model to incorporate influences of habitat on population stability (*lambda*), in order to inform ongoing conservation planning for State Forests in Washington. My objectives were not to predict actual population performance, but to use existing information and theory to rank spatially explicit forest management scenarios according to their relative influence on murrelet populations. Radar studies on Washington's Olympic Peninsula and radio-telemetry in central California suggest 58 ha of forest nesting habitat per murrelet, which corresponds well with habitat estimates from satellite imagery and population estimates from at-sea sampling. Regional context determined how State Forests influenced carrying capacity, potentially doubling K in southwest Washington compared with a 15-25% increase on the Olympic Peninsula where habitat on federal lands is abundant. I modeled influences of habitat quality, as mediated by fragmentation, on nesting and fledging rates. Assuming nesting and fledging rates were lower in fragmented habitat, conservation efforts in southwest Washington showed the potential to support meaningful increases in *lambda* (from 0.94 to 0.96-0.97 with my assumptions for rate parameters and definition for fragmentation). In contrast, conservation on State Forests on the Olympic Peninsula had little potential to influence population stability (range in *lambda*, 0.976-0.979). These predictions have been useful in fashioning explicit conservation plans at multiple spatial scales, from small watersheds to statewide, *i.e.*, southwest Washington vs. Olympic Peninsula.

- 44 CONSEQUENCES OF HABITAT CHOICE FOR BREEDING RIPARIAN BIRDS: COMPARING RESTORED AND REMNANT SITES IN THE CENTRAL VALLEY OF CALIFORNIA. **CHRISSEY A. HOWELL**, Nadav Nur, and Geoffrey Geupel, PRBO Conservation Science, Stinson Beach, CA 94970. Riparian habitats are among the rarest and most degraded in North America; in California's Central Valley over 98% of the riparian habitat has been lost in the past 150 years. As part of an unprecedented effort to restore riparian habitat and wildlife populations in the region, PRBO Conservation Science has been conducting intensive monitoring of riparian bird populations at restored and intact remnant riparian sites within the Central Valley to evaluate the success of restoration projects. Restoration monitoring has occurred since 1994 at multiple riparian sites along the Sacramento River, San Joaquin River, and the Cosumnes River (4-8 monitoring plots per river system). Following restoration, the vegetative structure and complexity has increased. We examined avian abundance and vegetation characteristics at sites as a function of time since restoration in order to assess habitat selection "choices" by birds and to see how these "choices" varied over time. We also measured the fitness consequences of these "choices" in terms of nest success and we compare habitat "choices" with their corresponding fitness consequences. Restoration projects coupled with long-term monitoring provide a great opportunity to test avian responses to changes in habitat structure in terms of habitat selection choices, as well as the consequences of these choices in terms of reproductive success. R 1445-1500
- 45 West Nile Antibody Prevalence in California Raptors. \***JOSHUA HULL**, Wildlife and Ecology Unit, VGL, UC Davis, Davis, CA 95616; Angus Hull, Golden Gate Raptor Observatory, San Francisco, CA 94123; John Keane, Sierra Nevada Research Center, Pacific Southwest Research Station, USFS, Davis, CA 95616; William Reisen, Davis Arbovirus Research Unit, UC Davis, Davis, CA 95616; Ying Fang, Davis Arbovirus Research Unit, UC Davis, Davis, CA 95616; Michael Bradbury, Richard Anderson, and James Estep, Swainson's Hawk TAC, Sacramento, CA; Jeffery Dunk, Department of Environmental and Natural Resource Sciences, Humboldt State University, Arcata, CA 95521; Jennifer Blakesley, Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, CO 80523; Thomas Muntun, Sierra Nevada Research Center, Pacific Southwest Research Station, USFS, Davis, CA 95616; Holly Ernest, Wildlife and Ecology Unit, VGL, UC Davis, Davis, CA 95616. To assess the extent of West Nile Virus (WNV) exposure in California raptors, we tested sera from 272 Red-tailed Hawks (164 migration, 108 wintering), 17 Red-shouldered Hawks (5 migration, 12 wintering), 30 Cooper's Hawks (all migration), 49 Swainson's Hawks (all breeding), 16 Northern Goshawks (all breeding), and 102 Spotted Owls (all breeding) for antibodies against WNV. Preliminary results (82 samples yet to be tested) indicated WNV prevalence of 8.0% in Red-tailed Hawks ( $n=199$ ) 50.0% in Red-shouldered Hawks ( $n=12$ ), and 16.6% in Cooper's Hawks ( $n=30$ ). These preliminary results indicated significantly greater ( $p=0.01$ ) seroprevalence in Red-tailed Hawks wintering in the Central Valley than in Red-tailed Hawks sampled during migration in the Marin Headlands. This difference may reflect differing regions of origin, with different levels of WNV activity during the 2004 breeding season, between Red-tailed Hawks wintering in the Central Valley and those migrating through the Marin Headlands. None of the WNV antibody positive individuals displayed overt signs of WNV infection at the time of specimen collection. No antibodies against WNV were found in Swainson's Hawks, Northern Goshawks, or Spotted Owls. This pattern may change in subsequent seasons as WNV becomes established throughout California. F 1345-1400
- 46 DISMAL STATUS OF THE EASTERNMOST SUBSPECIES OF THE BEWICK'S WREN. **DOUGLAS JAMES** and Andrea Green, Dept. Biological Sciences, Univ. Arkansas, Fayetteville, AR 72701. Bewick's Wrens were abundant in the eastern United States at the end of the 1800s into the mid 1900s, even extending then into the northern states east of the Great Plains. Since the mid 1900s it has declined precipitously and presently is very rare or absent throughout its eastern range. Results from the Breeding Bird Survey show the populations have declined by 99.8% since 1967, and on the eastern Christmas Bird Counts it is now virtually absent. Disappearance of early successional habitats in the east is the best reason for the demise, not competition with expanding House Wren populations. We find the race *altus* does not differ from *bewickii*, the latter being the only subspecies in the region east of the Great Plains. S 1115-1130
- 47 CHANGE IN THE FIRST CATEGORY SONG OF A POPULATION OF HERMIT WARBLERS IN 11 YEARS. **STEWART JANES** and Lee Ryker, Biology Dept., Southern Oregon Univ., Ashland, OR 97520. First category songs of a population of Hermit Warblers on Mount Hood, Oregon were recorded in 1990 and 1992. When the population was revisited in 2003, the birds sang a different first category song. The new song was similar in many respects to the earlier song but involved the loss of the distinctive terminal syllable, the division of the introductory series of repeated syllables into two different parts, and an increase in the duration of the introductory phrase. In 2004 a 20 km radius circle centered on the original population was systematically searched. The earlier song was not located within the search area, but four individuals were found singing the song 23-26 km to the east within an area where the new song is also sung. The nature of the changes suggests that the song changed within the current population rather than displacement by individuals from another song population. This is the first description of cultural evolution in the first category song of a wood warbler (Parulidae). R 1430-1445
- 48 GREEN-TAILED TOWHEE RESPONSE TO PRESCRIBED FIRE IN MOUNTAIN SHRUBLAND. \***GRETCHEN JEHLE** and Julie A. Savidge, Dept. Fishery and Wildlife Biology, Colorado State Univ, Fort Collins, CO 80523; Natasha B. Kotliar, USGS Fort Collins Science Center, 2150 Centre Avenue, Fort Collins, CO 80526. Fire alters the structure and composition of shrub-lands and may affect habitat quality for the associated avifauna. Because shrub-land systems have been greatly reduced from their original extent in western North America and fire is increasingly being used to manage these landscapes, a better understanding of how fire affects vegetation and wildlife is imperative. We evaluated the response of Green-tailed Towhees to prescribed fire in the upland shrub system of Rocky Mountain National Park, Colorado. Green-tailed Towhee density and shrub cover were both generally higher in unburned areas. Nests ( $n = 179$ ) were located in unburned vegetation with greater shrub cover and greater proportion of live shrubs than unused locations. Within burned sites, all nests were in unburned remnant patches. Common juniper shrubs were disproportionately selected as a nest substrate. Green-tailed Towhee nest survival was 57% (95% CI = 49-65%) across the two years of the study. Nest survival was higher in nests that were completely concealed, initiated earlier, and located in common juniper shrubs. Contrary to our predictions, nest survival was lower in the site with the highest density of nests and the highest shrub cover, indicating that different mechanisms S 1415-1430

may have affected survival at that site. Our results suggest that Green-tailed Towhee response to fire corresponds to the dynamics of post-fire shrub regeneration. Because elk herbivory inhibits shrub growth in Rocky Mountain National Park, the combination of prescribed fire and herbivory may reduce suitable habitat for Green-tailed Towhees over longer periods in this system.

- 49 NESTING SUCCESS AND CHICK SURVIVAL OF SYMPATRIC PRAIRIE GROUSE SPECIES IN CENTRAL SOUTH DAKOTA. **KENT C. JENSEN** and Mark A. Norton, Dept. Wildlife and Fisheries Sci., South Dakota State Univ., Brookings, SD 57007; Gregory A. Wolbrink and Anthony P. Leif, SD Dept. Game, Fish and Parks, Huron, SD 57350. We have initiated 3-year study of reproductive success and habitat use of sympatric populations of greater prairie chickens and sharp-tailed grouse on the Ft. Pierre National Grasslands (FPNG) in central South Dakota. Female greater prairie chickens and sharp-tail grouse were captured and radio-collared in March and April of 2003 ( $n=14$ ) and 2004 ( $n=35$ ) on display grounds within the FPNG. Nesting success will be estimated from these hens. Radioed hens were used to locate and facilitate capture of broods. Prairie grouse chicks were captured and radio-marked in June/July of each year; marked chicks were used to estimate chick survival from about 10 days of age through fledging. Nesting success for 2003 was 78.6% (11 of 14 nests), with 63.3% brood survival (7 of 11 broods), and 43% chick survival. Hen survival through the nesting period in 2003 was 77% (11 of 14 hens). Preliminary results for 2004 showed 75.7% nest success for first nesting attempts (27 of 35 nests). We have radio-marked 55 chicks so far in 2004 to monitor chick and brood survival. We also continue to monitor hen survival through 2004, and will continue the project through the 2005 breeding season. We will continue further analysis to relate nesting success and brood/chick survival to levels of sympatry and habitat conditions and variables. F 1330-1345
- 50 ESTIMATING NEST SUCCESS: THE MAYFIELD METHOD AND OTHER MEMORIES. **DOUGLAS H. JOHNSON**, USGS Northern Prairie Wildlife Research Center, St. Paul, MN 55108. The simple notion of determining the success of a group of nests has a rather long history. It is straightforward to divide the number of nests that succeed by the total number of nests. That method is perfect if the investigator is aware of all the nests that were established. Typically, however, investigators deal with only samples of nests. Therein lies the problem: most samples of nests are biased, because they include a higher proportion of nests that succeed than they should. This bias was noted a half-century ago, but researchers were slow to grasp its importance and adopt appropriate remedies. What appears to be a straightforward problem in survival analysis has manifested several interesting nuances. In particular, different assumptions made about nests that failed between two visits have led to a variety of methods. In this talk I will survey the early efforts on the topic of estimating nest success, point out both the advances made and the missteps taken, and indicate how that work laid the foundation for the sophisticated methodology now available. W 0915-1000
- 51 MEASURING HABITAT QUALITY: OPTIONS AND TRADE-OFFS. **MATTHEW D. JOHNSON**, Dept. Wildlife, Humboldt State Univ., Arcata, CA 95521. Ornithologists struggle with measures of habitat quality conceptually and empirically. I categorize methods to measure habitat quality, highlighting the distinctions among methods that emphasize the primacy of demographic processes, patterns of distribution, individual animal condition, and direct measures of resources and their constraints. I apply these measures to non-breeding warblers in Jamaica, West Indies. Among 6 broad vegetation categories, various measures of habitat quality were largely congruent. Labor-intensive measures of survival coupled with estimates of individual body condition provided the most informative measures. Labor minimizing measures, such as density, provided reasonable habitat quality estimates, especially late in the winter after most mortality and dispersal had occurred. Isodar analyses of density revealed several nuances of habitat quality, but relied upon understanding the role of interference competition in the birds' distribution. Future studies should seek to identify, *a priori*, the measures that will yield the most appropriate information efficiently. For cases in which such a determination is impossible, I suggest a method to quantitatively summarize multiple independent measures of habitat quality. R 1045-1100
- 52 DEVELOPING GENERAL INDICES FOR AGEING NESTLINGS. AN EVALUATION USING FOUR SPECIES. **DENNIS JONGSOMJIT**, PRBO Conservation Science, Stinson Beach, CA 94970; Stephanie L. Jones, U.S. Fish and Wildlife Service, Denver, CO 80225; Nadav Nur, PRBO Conservation Science, Stinson Beach, CA 94970; Thomas M. Haggerty, Dept. of Biology, Univ. of North Alabama, Florence, AL 35362; Ryan D. Burnett, Thomas Gardali, and Geoffrey R. Geupel, PRBO Conservation Science, Stinson Beach, CA 94970. Recently emerging methods have been shown to be statistically powerful in modeling avian nest survival. However, many of these new methods require the age of the nest to be estimated upon finding. Nests are often discovered during the nestling stage. Therefore, in an effort to increase researchers' ability to age nests found in this period, we are collecting various morphometric data of known age nestlings for several species at several sites. Our objective here is to develop general indices for nestling ageing that can be used across species. With data collected in the first year of our project we evaluated eleven different measurements of body size and feather development to determine their ability to predict nestling age. We examined four different species from 3 study sites using linear models. The best predictive model differed for each species (Carolina Wren  $R^2 = 0.959$ , Song Sparrow  $R^2 = 0.874$ , Dusky Flycatcher  $R^2 = 0.959$ , American Goldfinch  $R^2 = 0.978$ ). However, only four of the 11 variables were included in the best predictive model for any species: wing length, tarsus length, mass, and culmen. These four variables together produced a good predictive model of nestling age for each species. Wing length, tarsus length, and culmen were significant ( $p = 0.05$ ) in 3 of the 4 species; nestling mass was significant in 2 of the 4 species. We evaluate the predictive ability of each species' model using cross-validation conducted on additional data collected in 2005. Poster
- 53 AVIAN USE OF FOREST EDGES DURING SPRING AND FALL MIGRATION IN PENNSYLVANIA. **GREGORY S. KELLER**, Dept. Biology, Eastern New Mexico Univ., Portales, NM 88130; David S. Klute, Colorado Division of Wildlife, Denver, CO 80216; Bradley D. Ross and Richard H. Yahner, School of Forest Resources, The Pennsylvania State Univ., University Park, PA 16802. Habitat use by birds during migration has been largely overlooked, although this short period is critical to migrant survival. We compared habitat use by birds during spring and fall migration along north- and south-facing forest-field edges and interior forest in two national parks in Pennsylvania, Gettysburg National Military Park and Valley Forge National Historical Park. We determined seasonal differences in species richness, F 1630-1645

species abundance, and mixed-species flock structure. Richness of all species combined, permanent residents, and short-distance migrants were highest during spring along south-facing edges, whereas richness of long-distance migrants and migratory transients was highest in interior forest during fall. Furthermore, mixed-species flocks were more common, larger, and higher in the canopy in interior forest compared to edges during fall, and were primarily located in direct sun in the canopy. Flocks were infrequently recorded during spring and not significantly different based on edge-type. Amount of sunlight penetration may be a better predictor of richness in these habitats compared to edge orientation, particularly during fall migration.

- 54 EVIDENCE FOR CHARACTER DISPLACEMENT IN THE SONGS OF YELLOW-RUMPED AND YELLOW-THROATED TINKERBIRDS. \***ALEXANDER KIRSCHER** and Daniel Blumstein, Dept. Ecol. And Evol. Biol., UCLA, Los Angeles, CA 90095; Hans Slabbekoorn, Dept. Biol., Leiden Univ., P.O. Box 9500, 2300 RA Leiden, the Netherlands; Thomas Smith, Dept. Ecol. And Evol. Biol., UCLA, Los Angeles, CA 90095. The acoustic adaptation hypothesis predicts that bird songs will diverge in accordance to the transmission properties of the environment. The sound environment hypothesis predicts that songs will diverge to occupy available niches in sound space. This implies that vocalizations of birds with similar songs will exhibit character displacement in sympatry to avoid species recognition errors. We analyzed tinkerbird songs recorded in Uganda to test the relative effects of habitat differences and presence in high density of the sister taxon on intra-specific song variation. The two species have similar monotonous songs, with small differences in frequency and delivery rate of notes. We recorded yellow-rumped and yellow-throated tinkerbirds at 10 national parks and forest reserves in Uganda, representing closed rainforests and open ecotone or woodland habitat. We classified population densities as high or low for each species. We measured spectral and temporal features of song for each bird recorded, and assessed song variation between populations. We found significant divergence in frequency characteristics between populations of each tinkerbird when the sister taxon was present in high densities, when compared to populations with the sister taxon absent or present in low numbers. Habitat type explained no variation in song frequency characteristics. Thus, we infer that character displacement has occurred in the songs of these populations. R 1445-1500
- 55 U.S. FISH AND WILDLIFE SERVICE LAUNCHES NEW MONITORING AND ADAPTIVE MANAGEMENT INITIATIVE. **MELINDA G. KNUTSON**, Harold Laskowski, and Socheata Lor, USFWS, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603. The U.S. Fish and Wildlife Service (FWS) National Wildlife Refuge System (NWRS) is the world's premiere system of lands set aside for the purpose of conserving America's fish, wildlife, and plants. The refuge system relies on science to achieve its highest contributions toward wildlife resources, and to support refuge management decisions, reduce the uncertainty of management outcomes, and improve efficiency. The need to increase science capacity within the NWRS was identified as a priority issue by Promises Action Teams and the Conservation in Action Summit in the wake of the Refuge System Improvement Act of 1997. The Biological Monitoring Team (BMT) is a pilot effort to implement multi-refuge biological monitoring and adaptive management in FWS Regions 3 and 5 as a first step towards a national program. The BMT's primary functions are to facilitate the development of standardized inventory and monitoring programs and associated databases. A cooperative research effort with the U.S. Geological Survey is focused on conducting adaptive management projects at multi-refuge scales. The BMT coordinates, facilitates communication, and monitors the progress of these projects. These and other efforts will also help the Refuge System to be an effective partner in achieving broader conservation goals that extend beyond refuge boundaries. These functions are central to the 'wildlife first' mission of the Refuge System Improvement Act of 1997. Poster
- 56 SEASONAL BODY WEIGHT VARIATION IN FIVE SPECIES OF WOODPECKERS. **WALT KOENIG**, Hastings Reserve, UC Berkeley, Carmel Valley, CA 93924; Eric Walters, Dartmouth College, Hanover, NH 03755; Jeff Walters, Virginia Polytechnic, Blacksburg, VA 24061; Jim Kellam, Franklin and Marshall College, Lancaster PA 17604; Klaus Michalek, Medical Univ. of Vienna, A-1090 Vienna, Austria; Matt Schrader, Florida State Univ., Tallahassee, FL 32306. We investigated patterns of seasonal variation in body weight in six populations of five resident species of temperate-zone woodpeckers (Acorn Woodpecker, Red-bellied Woodpecker, Red-cockaded Woodpecker, Downy Woodpecker, and Great Spotted Woodpecker). After controlling for time of day and overall body size, annual variation in body weight was small and generally not statistically significant. However, analysis revealed evidence of significant "winter fattening," comparable in magnitude to other temperate-zone resident species, in three of the species. The degree of winter fattening did not correlate with either the size of the acorn crop (for the Acorn Woodpecker) or latitude, two variables potentially related to predictability of food resources. However, the smaller species exhibited significantly greater winter fattening than the larger species, as predicted by the hypothesis that energy storage should be more important for small-bodied species. Furthermore, the food-storing Acorn Woodpecker exhibited about one-fourth the winter fattening of the non-food-storing species, in support of the hypothesis that food storage provides an ecological alternative to winter fattening. R 1530-1545
- 57 EFFECTS OF INCOMPLETE INFORMATION IN COMPLEX HABITATS ON OCCUPANCY PATTERNS AND POPULATION DYNAMICS. **WILLIAM B. KRISTAN III**, Dept. Biological Sciences, California State University, San Marcos, CA 92096. Habitat is multivariate and multi-scaled. Although habitat-specific reproductive success and survival probability are common findings in studies of avian habitat ecology, the effects of habitat quality on habitat occupancy patterns and population dynamics depends on the ability of birds to judge habitat quality, which in turn are based on environmental cues present at the time that choices are made. Conditions that greatly effect fitness, such as predation and food levels, may not be directly observable at the time when territories and nest sites are selected, and cues may present only partial indications of habitat quality. Thus, the information content of environmental cues has profound effects on avian population ecology, and complex environments are expected to present birds with complex and incomplete information. This problem can be illustrated with simple population models that relate survival and fecundity to two different environmental gradients, which themselves can be correlated in different ways, and about which individuals can be assumed to have differing amounts of information. In complex habitats, it may not be possible to maximize both survival and fecundity, and information may be more readily available about one demographic rate than the other. Under these circumstances, distribution patterns may be more strongly influenced by the environmental gradient that provides more information, even if it has a smaller influence on fitness. These R 1130-1145

simple models illustrate the importance of distinguishing between habitat choice (based on environmental cues) and consequences of the choice (determined by habitat quality), and studying the relationship between the two.

- 58 A COMPARISON OF BIRD POPULATIONS ON CALIFORNIA GROUND SQUIRREL COLONIES AND NON-COLONIZED GRASSLAND. **COLLEEN LENIHAN**, Wildlife, Fish and Conservation Biology, University of California, Davis, CA 95616. Often considered pests, California ground squirrels and their colonies may support an assemblage of increasingly rare and threatened species whose populations are declining. The mosaic of vegetation structure, burrows and higher prey abundance on colonies may affect the patterns of species diversity in grassland communities. In this study, I test the hypothesis that California ground squirrels may influence the community structure of grassland birds. Five paired sites (grassland with ground squirrel colonies and grassland without ground squirrels) were surveyed over two breeding seasons (April-June) and two autumn (September-November) and winter (January-March) periods to determine whether "ground squirrel vs. no ground squirrel" grassland sites differed in the size and diversity of their associated bird populations. I also monitored raptor activity on all five paired sites during the period of the study. Avian point counts were analyzed to determine differences in species abundance, richness, diversity and community similarity. Raptor presence and behavior on study sites was analyzed to compare frequency of use and hunting preferences between the paired sites. R 1030-1045
- 59 ANALYZING AVIAN NEST SURVIVAL IN FORESTS AND GRASSLANDS: A COMPARISON OF THE MAYFIELD AND LOGISTIC-EXPOSURE METHODS. **JOHN D. LLOYD**, Ecostudies Institute, Estacada, OR 97023; Joshua J. Tewksbury, Dept. Biology, University of Washington, Seattle, WA 98195. Several new and flexible methods for estimating avian nest survival have been developed recently. These methods offer the opportunity to test hypotheses about variation in nest survival that were difficult to test with the Mayfield method, the standard approach for nearly three decades. Although these new approaches advance our ability to develop realistic and robust models of nest survival, some require specialized software packages and all require a working knowledge of advanced mathematical concepts. In contrast, the Mayfield estimator can be calculated by hand, and hypotheses can be easily tested using simple chi-square tests. Despite its simplicity and ease of use, researchers are being encouraged to discontinue use of the Mayfield estimator entirely. However, in some cases, might the Mayfield method yield comparable results and thus remain a useful tool? We addressed this question using data from two different studies that addressed avian nest survival: one comparing habitat-specific nest survival of Chestnut-collared Longspurs and one examining effects of habitat fragmentation on nest survival in riparian birds. In both cases, using the recently developed logistic-exposure method provided insights that the Mayfield method could not; nonetheless, the principal conclusions of both studies were unaffected by the choice of a method for analyzing nest survival. Mayfield and the logistic-exposure method produced similar estimates of nest survival among treatments in both studies. Thus, we conclude that the Mayfield method remains useful when the question of interest involves estimating and comparing nest survival among a limited number of categories or treatments. W 1320-1340
- 60 HORMONAL AND CELLULAR MECHANISMS OF MIGRATORY FATTENING IN THE DARK-EYED JUNCO. **\*JENNIFER A. LONG** and Rebecca L. Holberton, Dept. of Biological Sciences, Univ. of Maine, Orono, ME 04469. The ability of migratory birds to rapidly gain fat in preparation for migration is a well-known phenomenon, but the physiological basis of migratory fattening is poorly understood. Field and laboratory studies have shown that corticosterone (CORT), the major energy-regulating steroid in birds, increases while birds undergo migratory fattening. Evidence from migratory birds sampled during different times of the year also suggest that the activity of the liver enzyme fatty acid synthase (FAS) increases seasonally to facilitate migratory lipid synthesis. The objective of this study was to test the hypothesis that CORT is involved in the up-regulation of hepatic FAS necessary for migratory fattening. To test this, we used Dexamethasone to inhibit an increase in CORT in Dark-eyed Juncos that were switched from short to long days to induce the transition to migratory condition. While Control birds increased FAS activity during the first week on long days, and were able to maintain body mass, CORT-inhibited birds did not. CORT-inhibited birds, however, were able to increase FAS activity by the third week. Our results suggest that CORT may play an initial stimulatory role in FAS activity, but that other factors, such as increased food intake, may also stimulate FAS once migratory condition is established. Our current research on re-feeding responses during the non-migratory period will help further elucidate the mechanisms underlying feeding and fattening in migratory birds. Understanding the physiological basis of migratory fattening is central to understanding how migrants meet their energy demands during this critical period of the annual cycle. R 1545-1600
- 61 BRINGING ORNITHOLOGY TO K-12 CLASSROOMS. **\*JENNIFER A. LONG** and Brent M. Horton, Dept. of Biological Sciences, Univ. of Maine, Orono, ME 04469. Education is a vital component to the continued success of bird conservation efforts. A National Science Foundation sponsored program at the University of Maine (NSF GK-12) helps meet this need. The program provides fellowships for outstanding graduate students to recurrently demonstrate science in local K-12 classrooms. A major goal of the NSF GK-12 program is to enhance K-12 science education and awareness by providing expertise, equipment, activities, and role models that would not otherwise be available to K-12 teachers and students. Although the program enhances learning in many areas of science, here we present examples of ways to foster an appreciation of nature through lessons in ornithology. For example, first grade students learned the basics of bird diversity through hands-on activities including: playing games that demonstrate the function of bird beaks, investigating the composition of owl pellets, and using microscopes to examine different feather types. High school students used museum specimens, field guides, outdoor bird walks, and mist-netting activities to learn about bird identification, migration, and conservation. Another group of students, ranging from 4th-7th grades, conducted real science by participating in Project Feeder Watch (PFW), a winter-long bird survey coordinated by Cornell University's Laboratory of Ornithology. Students trained for this project by studying avian external anatomy, field identification, winter ranges, and attending mist-netting field trips. Students defined their own count sites, maintained and monitored their feeders, and recorded the number and species of birds visiting their feeders during winter. The Poster

students' PFW data were sent to Cornell to help ornithologists detect and explain gradual changes in winter bird populations and distribution. These students also applied the scientific methods to test their own hypotheses about seed preferences. We believe that these hands-on activities in ornithology are great tools for enhancing science education in K-12 classrooms and instilling a lifelong appreciation for bird conservation.

- 62 ANTIBODY PREVALENCE OF WEST NILE VIRUS IN THE BIRDS OF NORTHWESTERN ARKANSAS DURING THE 2004 TRANSMISSION SEASON. \***ANDY LOWRY**, Dept. Biology, University of Arkansas, Fayetteville, AR 72701; Lisa Newberry, Arkansas Livestock and Poultry Commission, #1 Natural Resources Drive, Little Rock, AR 72205; Dustan Clark, Dept. Poultry Science, University of Arkansas, Fayetteville, AR 72701; Max Miesch, Dept. Entomology, University of Arkansas, Fayetteville, AR 72701; Doug James, Dept. Biology, University of Arkansas, Fayetteville, AR 72701. Since its introduction to North America in 1999, West Nile Virus (WNV) has spread rapidly across the continent. The strain that entered the U.S. has proven particularly virulent in some bird species. Much geographic variation has been found in WNV's activity making it necessary to determine how WNV is impacting the birds of northwestern Arkansas. A serosurvey of common feeding station birds was conducted during the transmission season of 2004. 253 birds representing 29 species, 16 families, and 3 orders were captured and tested. Of these, 68% had anti-WNV antibodies. Antibody prevalence began rising in May and peaked in September. Birds were significantly more likely to display anti-WNV antibodies in urban areas than rural ( $p = 0.0273$ ). Age, sex, wing-length, weight, and fat deposition displayed no significant effect on the presence of anti-WNV antibodies. Most species showed resistance to WNV with the exception of the Brown-headed Cowbird and the House Sparrow, which had small samples sizes of 3 and 2 respectively. This suggests that the impacts of WNV on these populations of common feeding station birds should be minimal in northwestern Arkansas. Poster
- 63 USING EGG FLOTATION AND EGG SHELL EVIDENCE TO DETERMINE AGE AND FATE OF ARCTIC SHOREBIRD NESTS. **TODD MABEE**, ABR Inc., Forest Grove, OR 97116; Ann Wildman and Rick Johnson, ABR Inc., Fairbanks, AK 99708. We floated eggs to estimate incubation age and collected eggshell evidence to determine nest fate at nests of 11 species of shorebirds on the Arctic Coastal Plain of Alaska during 2002–2004. We present egg flotation schedules for 9 species to facilitate the estimation of nest age. We tested the predictive ability of the egg flotation schedule for Semipalmated Sandpiper and were able to estimate incubation age within ~ 1–3 d of the actual hatch date. Patterns of eggshell evidence were similar across species, with eggshell fragments (1–5 mm) present at most successful nests (96%) and eggshell tops or bottoms present only at successful nests. We determined nest fate independently of eggshell evidence and then used discriminant function analysis to predict the probability of correctly classifying a nest's fate given different types of eggshell evidence. The use of eggshell fragment evidence resulted in the correct classification of the fate of all 11 species of shorebirds in 92% of the cases. Both the egg flotation technique and eggshell evidence can be used in future studies to calculate accurate measures of reproductive success that are needed for ecological investigations of shorebirds, an important group of declining birds. F 1545-1600
- 64 IDENTIFYING HABITAT SINKS: A CASE STUDY OF COOPER'S HAWKS IN AN URBAN ENVIRONMENT. **R. WILLIAM MANNAN**, Sch. Natural Resources, Univ. Arizona, Tucson, AZ 85721; Clint W. Boal, USGS-BRD Texas Coop. Fish & Wildl. Res. Unit, Texas Tech Univ., Lubbock, TX 79409-2120; Robert J. Steidl, Sch. Natural Resources, Univ. Arizona, Tucson, AZ 85721. In 1997, we identified the metropolitan area of Tucson, Arizona as an ecological trap for Cooper's hawks because about 40% of the nestlings hatched in the city died from trichomoniasis, an urban-related disease. Effects of the disease were severe enough that the population did not appear to be self-sustaining ( $\lambda = 0.92$ ), and we considered the city a potential "habitat sink." The primary weakness in our estimation of population growth was the estimate of 20% annual survival of juvenile hawks. Our model indicated that the population would be stable if annual survival of this cohort was >29%. In 1999 and 2000, we studied the movements and survival of fledgling Cooper's hawks with radio-telemetry and found that survival during the seven-month period after fledging was 67%. Thus, our determination that Tucson functioned as a habitat sink for Cooper's hawks was likely the result of underestimating the rate of survival of juvenile hawks and, consequently, population growth. References to habitat sinks are common in the literature, but conclusive evidence for them is rare. We argue that habitat sinks should be uncommon under natural conditions because the ability of an animal to recognize the environmental cues that trigger a "settling response" is the product of natural selection. Thus, places where animals settle usually should be suitable for them. In contrast, the concept of habitat sinks is sound if the underlying mechanism is an ecological trap, caused by human-induced changes in the environment, where areas triggering residency have a feature, event, or organism that causes unusually high mortality or low productivity. R 1330-1345
- 65 SEASONAL INTERACTIONS AND CARRY-OVER EFFECTS: MEASURING THE CONSEQUENCES OF HABITAT OCCUPANCY JUST GOT A WHOLE LOT HARDER. **PETER P. MARRA**, Smithsonian Environmental Research Center, PO Box 28, Edgewater, MD, USA 21037-0028. Migratory birds spend different parts of the annual cycle in geographically disparate places. The consequences of habitat occupancy and the resulting conditions of individual birds at winter locations are likely to affect individual performance during the breeding season, and vice versa. This simple fact has important implications for the ecology, evolution, and conservation of migratory birds. Such inter-seasonal effects are poorly understood within most bird migration systems, in large part because it has been difficult to determine the connections between specific summer and winter populations. A better understanding of migratory connectivity will allow researchers to address questions regarding the ecological and evolutionary implications of habitat occupancy and seasonal interactions. Stable isotopes have contributed enormously to our ability to link events in the annual cycle and research in my lab has begun to uncover the ecological and evolutionary significance of these connections. For example, we have shown that events on wintering areas, *i.e.*, patterns of habitat occupancy, can determine breeding productivity and influence annual survival and that reproductive effort drives molting latitude and feather color. In this talk, I will emphasize the importance of examining within season patterns of habitat occupancy the concept of migratory connectivity and seasonal interactions and explore through specific examples how understanding migratory connectivity is essential to our basic understanding of how habitat occupancy migratory bird biology. R 1415-1430

- 66 HABITAT UTILIZATION BY NEST PREDATORS: DOES IT MATTER TO NESTING BIRDS? **JOHN M. MARZLUFF**, John Withey, Kara Whittaker, David Oleyar, Jack DeLap, Thomas Unfried, and Stan Rullman, Col. Forest Resources, Univ. of Washington, Seattle, WA 98195. Much research has focused on determining the resources that influence birds' use of particular areas. But little is known about how the occurrence of predators affects avian resource use. We explore the utility of simply mapping where predators are seen as a tool to explain variation in resource use and reproductive performance by birds in temperate, coniferous forests of western Washington. As we spot mapped forest fragments within 1km<sup>2</sup> suburban landscapes, we noted the identity, number, and location of red squirrels, eastern gray squirrels, least chipmunks, Steller's Jays, American Crows, and rarer mammalian and avian predators. Over the course of a breeding season, we spent from 50-several hundred hours determining the relative abundance of breeding songbirds, and the reproductive output, survivorship, movements, and nest placement of American Robins, Song Sparrows, Spotted Towhees, Winter Wrens, Bewick's Wrens, Black-headed Grosbeaks, Wilson's Warblers, Dark-eyed Juncos, Swainson's Thrushes, and Pacific Slope Flycatchers, in each of 30 sites. As we surveyed, searched, netted, and monitored, we mapped predator locations. We derived a utilization distribution (UD) for predators at each research site using fixed kernel smoothing techniques. We related the height of the predator UD (the probability that we saw a predator at that location) to the success of nests, Vickery score of monitored territories, and abundance of breeding birds. We investigate the utility of this tool by examining how variation in geographic scale, predator abundance, and predator identity affect the relationships between predator utilization and songbird abundance and productivity. Mapping predator use of research sites is easily accomplished during ordinary fieldwork. Incorporating predator use into investigations of bird abundance and productivity increases our understanding of mechanisms that affect avian habitat use and habitat quality, thereby clarifying our ability to effectively manage birds. R 1100-1130
- 67 RELATIONSHIPS BETWEEN NEST SURVIVAL AND HUMAN INFRASTRUCTURE ON ALASKA'S ARCTIC COASTAL PLAIN: USING A COX PROPORTIONAL HAZARDS MODEL FOR DEPENDENT DATA. **TRENT McDONALD**, 2003 Central Ave, Cheyenne, WY 82001; Joe Liebezeit, Wildlife Conservation Society, Pacific West office, 219 SW Stark Street, Suite 200, Portland, OR 97202; Steve Kendall, U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge, 101 12th Ave., Box 20, Room 236, Fairbanks, AK 99708; Philip Martin, U.S. Fish and Wildlife Service, Fairbanks Fish and Wildlife Field Office, 101 12th Ave., Box 19, Room 110, Fairbanks, AK 99708; Charles Johnson, P.O. Box 80410, Fairbanks, AK 99708; Caryn Rea, ConocoPhillips Alaska, Inc., P.O. Box 100360, 700 G Street, Anchorage, AK 99510-0360; David Payer, U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge, 101 12th Ave., Box 20, Room 236, Fairbanks, AK 99708; Steve Zack, Wildlife Conservation Society, Pacific West office, 219 SW Stark Street, Suite 200, Portland, OR 97202; Stephen Brown, Manomet Center for Conservation Sciences, P.O. Box 1770, Manomet, MA 02345. Nest survival of tundra-nesting birds on the Arctic Coastal Plain of Alaska may be affected by proximity to human infrastructure such as roads, oil production facilities, housing facilities and landfills. A potential explanation for such an effect is that increased predator abundance near food attractants (such as dumpsters and landfills) and structural attractants (that support denning and/or nesting) may increase nest predation rates. A number of studies suggest nest predators are more abundant near human infrastructure. However, no studies have attempted to determine if nesting success of ground-nesters may be impacted by these reported increases. In 2002, a cooperative group of public and private entities initiated a study to investigate this question. Randomly placed 10-ha plots were established at 6 study sites across the arctic coastal plain. Distance of plots from human infrastructure varied from 0 m to 36 km. Within each plot, investigators used common protocols to identify nests and monitor nest fate. We applied a spatially adjusted proportional hazards survival model to relate the instantaneous probability of predation to covariates such as habitat, year, an index of predator abundance, and proximity to human infrastructure (classified into 5 levels of potential predator attraction and 2 levels of infrastructure density). This model is an extension of a so-called frailty survival model that adjusts for potential correlation between the lifetimes of nests located close to one another. Frailty models are, in turn, extensions of the Cox proportional hazards model that allow a random effect in the baseline hazard to account for intra-cluster correlations. In this presentation we describe the study protocol, selected covariates, and the spatially adjusted proportional hazards model. W 1420-1440
- 68 OFFSPRING QUALITY MATTERS IN A TROPICAL PASSERINE WITH A CLUTCH SIZE OF TWO EGGS. **\*MATTHEW C. MEDEIROS** and Leonard A. Freed, Dept. Zoology, UH-Manoa Honolulu, HI 96822. Avian life history characteristics are shaped by factors that influence the survival of offspring from egg to recruitment. Investigation of these factors can provide explanations for variation in reproductive success between individuals at different stages. While some studies have demonstrated that juvenile survival in birds is correlated with nestling mass, few studies have quantitatively assessed similar patterns in offspring outside of the nest, especially in tropical passerines. The post-fledging period may be particularly important because fledglings have higher energetic rates and greater risk of predation than nestlings. Seventeen years of existing mark and recapture data from Hakalau Forest National Wildlife Refuge were analyzed to determine patterns of survival, relative to mass at initial capture, of fledgling Hawai'i Akepa caught from July- September. The endangered Hawai'i Akepa is an insectivorous, highly philopatric honeycreeper with an extremely conservative life history. The probability of recapture at least one year after the initial capture date was significantly greater for heavier fledglings caught during July through September ( $p=0.0005$ , logistical regression). This suggests that mass indicates fledgling quality. Fat levels were positively associated with mass ( $p<0.0001$ ). This may represent the selective advantage of heavier fledglings. These results deal with important issues in life history theory. Offspring quality and quantity are considered a trade-off in determining clutch size. The small clutch size of two eggs in birds emphasizes the quality end of the continuum, which might be especially important in tropical birds with limited recruitment opportunities associated with high adult survival. This study shows that offspring quality R 1630-1645

matters in a tropical passerine even with its small clutch size.

- 69 EXPENSIVE MANAGENT: QUANTIFYING THE COSTS OF AN ACTIVE HAZING PROGRAM IN ALEUTIAN GEESE. F 1145-1200  
\***ANNE E. MINI** and Jeffrey M. Black, Dept. Wildlife, Humboldt State Univ., Arcata, CA 95521. By minimizing energy expenditure and maximizing caloric intake, spring staging geese can achieve a net surplus of energy necessary for migration and breeding. Uninterrupted feeding time and the quality and quantity of available foraging areas influence surplus energy acquisition. If individuals cannot achieve sufficient reserves, they should move on to more suitable areas. Aleutian Cackling geese may be shifting to more suitable spring staging areas. Aleutians have colonized two novel spring staging areas 150 km south of the traditional area where an active hazing program was implemented. We hypothesized that this shift was due to a change in the suitability of the traditional site. We analyzed reserve acquisition with abdominal profile indices. We calculated foraging opportunity, foraging effort, and the energy expenditure, which took into account daily time-budgets, disturbances, and commutes from the roost. We analyzed forage quality from collected grass samples and foraging habitat quantity from GIS map imagery. We found that geese staging in the traditional area had lower abdominal fatness, despite increased foraging effort, and experienced higher energy expenditure. Forage quality was not different between areas. These results suggest that Aleutians are shifting staging areas based on energetic demands and that the traditional staging site has changed in suitability.
- 70 CONSEQUENCES OF INDIVIDUAL CHOICE OF BROOD REARING AREAS AND CARRYOVER EFFECTS OF THESE DECISIONS ON REPRODUCTIVE MEASURES IN BLACK BRANT. F 1345-1400  
**CHRISTOPHER NICOLAI**, Program in Ecology, Evolution, and Conservation Biology, University of Nevada Reno, Reno, NV 89512; James Sedinger, Department of Natural Resources and Environmental Science, University of Nevada Reno, Reno, NV 89515; Jason Schamber, USGS, Alaska Science Center, 1011 E. Tudor Rd., Anchorage, AK 99503. Ideal free distribution theory predicts that individuals should make decisions that promote individual fitness in the long term. Previous studies have described variation in forage quality (Person et al. 1998) and gosling size (Herzog and Sedinger 2003, Nicolai *et al.* in review) among brood rearing areas and across years on brood rearing areas for Black Brant on the Yukon-Kuskokwim Delta, Alaska. Little is known about the effects of selecting these brood-rearing areas on attending adult females. Adult female Black Brant are typically at their lowest annual body condition at hatch and have been believed to regain body condition during brood rearing. We investigated effects of selection and use of these brood rearing areas on adult female body condition by comparing changes in body condition of adult females measured on the day their clutches hatched and again during banding operations approximately 35 days later. Our results indicate substantial variation in changes in body condition among brood rearing areas for female Black Brant during the period of gosling growth and adult remigial molt ( $\hat{\alpha}^* \uparrow$  residual body mass -300 to 300 grams). We further investigate effects of selecting a brood rearing area in year  $i$  and reproductive measures in year  $i+1$ . We demonstrate a trade-off between breeding propensity in year  $i+1$  and gosling size in year  $i$ . We detected no variation in clutch size or initiation dates in year  $i+1$  conditional on which brood rearing area was used in year  $i$ .
- 71 TEMPORAL AND SPATIAL ORGANIZATION OF THE RAPTOR COMMUNITY AT THE LAGUNA DE R 1115-1130  
SANTIAGUILLO BASIN, DURANGO, MEXICO. **JORGE NOCEDAL** and Manuel Calderón, Centro Regional Durango, INECOL, Durango, Durango, Mexico. We studied the raptor community at the Laguna de Santiaguillo Basin, located in central Durango, one of the most important wetlands of northern Mexico. From December 1999 to March 2001, we surveyed a 50 km route that surrounds the wetland and counted every raptor into 10-5 km transects. We recorded nine species during the surveys, six out of the surveys, and three more as accidentals to the area, for a total of 18 species for the whole raptor community. The American Kestrel and Red-tailed Hawk were the most important species, in terms of their abundances and permanence at the wetland. Both species were more abundant in winter due to the presence of wintering individuals whereas in summer they were less abundant and more spread out. Other resident species were White-tailed Hawk and Crested Caracara, less numerous and ecologically more restricted. The most important wintering species was the Marsh Hawk, common during all winter and most open habitats. The Prairie Falcon was mostly a transient raptor but was once recorded in mid-winter. Other transient raptors were Sharp-shinned Hawk, Merlin and Peregrine Falcon. Species not recorded while surveying the route were White-tailed Kite, Cooper's Hawk, Common Black Hawk, Harris' Hawk, Swainson's Hawk, and Golden Eagle. Accidental species, recorded very rarely, usually once, were the Osprey, Bald Eagle and Ferruginous Hawk. Differences in time and space distribution of raptors along the route were due to habitat features and human activities, such as crop fields and rural settlements. There were also differences in mean abundance for the two most important species whereas the Crested Caracara was equally abundant throughout the year. The Marsh Hawk showed greater abundances during both the fall and spring migration as compared to the wintering season. This species community represents a great opportunity for the study of ecological relationships among birds of prey, both during the breeding and the wintering seasons. Interestingly, a Red-tailed Hawk banded and tagged with a PTT in Wyoming, was located at the boundaries of the basin.
- 72 STATISTICAL MODELING OF NEST SURVIVAL USING COX PROPORTIONAL HAZARDS MODEL AND W 1100-1130  
PARAMETRIC SURVIVAL TIME REGRESSION. **NADAV NUR**, Mark Herzog, Aaron L. Holmes, and Geoffrey R. Geupel, PRBO Conservation Science, Stinson Beach, CA 94970. Survival-time analysis, also referred to as time-to-failure analysis, is a well-established maximum-likelihood method used primarily in biomedical applications to estimate survival (or conversely failure) rates over time. Survival-time analysis provides for sophisticated statistical modeling of factors that influence nest survival rates, it allows for the fact that nests may be discovered during the nesting cycle, and can incorporate the common result that the ultimate fate of a nest may be unknown. In particular, survival-time analyses allow one to estimate (and control for) variation in mortality rates over the course of the nesting period. Here we demonstrate applications of survival time analysis, illustrating its strengths, and evaluate this approach in contrast to other recently developed statistical methods, as well as the traditional Mayfield method. We present results from a



3-year study of Loggerhead Shrike nesting in shrub-steppe habitat and a 7-year study of Song Sparrow nesting in tidal marsh habitat, examining factors that determine nesting success. We also analyze simulated nest data, based on these empirical studies. We compare performance (such as bias and precision) of the Cox proportional hazards model and parametric survival time regression with the logistic-exposure model and the nest survival model of MARK. In particular, we examine the value of controlling for variation in nest survival rates with nest age and we examine the sensitivity of modeling results to errors in assigning nest age and date of nest failure. We demonstrate the ability of survival-time analysis to model correlated outcomes (*i.e.*, random effects). We conclude by considering potential limitations of the method, including the need to estimate the "age" of the nesting attempt at the time a nest "enters" the study, and discuss how these may be overcome.

- 73 DISTRIBUTION OF RIPARIAN BIRD SPECIES IN AN URBANIZING LANDSCAPE. \***AMBER S. ONEAL** and John T. Rotenberry, Dept. Biol. and Ctr. for Cons. Biol., Univ. of Calif., Riverside, CA 92521. In coastal southern California, natural riparian corridors occur in a landscape mosaic comprised of an abundance of anthropogenic land use categories interspersed with undeveloped areas, primarily native shrub-lands. We asked, "to what extent does the composition of the landscape surrounding a riparian survey point appear to influence the distribution of birds?" We also asked which spatial scale best described the distribution of birds. We conducted counts at 137 points in Orange County, California, within riparian habitats along a gradient of urbanization. The percent riparian and percent developed was generated for 10 buffer sizes ranging from 100 m to 1,000 m around each point using a vegetation layer and GIS. We then used logistic regressions to assess species distribution with respect to percent developed and percent riparian land cover separately for the 10 different buffer sizes. Of 52 species with sufficient detections to analyze, 39 had statistically significant ( $P < 0.05$ ) models. Of these, 33 showed a response to the proportion of development, with roughly twice as many showing a negative response (*e.g.*, Phainopepla, Oak Titmouse) as those showing a positive response (*e.g.*, Northern Mockingbird, Anna's Hummingbird). The most significant buffer size that best described each species distribution varied, split about equally between the small (*e.g.*, Black Phoebe, Phainopepla), medium (*e.g.*, Killdeer, Acorn Woodpecker), and large (*e.g.*, Yellow-breasted Chat, Western Scrub-jay) buffer sizes, with no apparent groupings by guild. Thus, the landscape matrix in which a survey point is embedded appears to influence bird species occurrences; however, the best scale to predict species occurrences varies by species. These findings can be applied to modeling species distributions, which can be used for reserve design and species conservation. F 1030-1045
- 74 THE INITIAL EFFECTS OF SALVAGE LOGGING ON BREEDING BIRD POPULATIONS IN ONE AREA OF THE 2002 MISSIONARY RIDGE FIRE, SOUTHWEST COLORADO. **JOSEPH C. ORTEGA**, Catherine P. Ortega, Joshua S. Walton, and Michael J. Vivalda, Dept. Biology, Fort Lewis College, Durango, CO 81301. From 9 June to 17 July 2002, the Missionary Ridge Fire (in southwest Colorado) burned 28,525 hectares in a mosaic pattern of fire intensities. We studied the effects of this fire on breeding bird populations from 19 May to 25 July 2003 and again from 6 June to 27 July 2004. As part of our research effort, we conducted DISTANCE sampling during 5-minute study periods per plot. However, for this report, we have included only those individuals observed within a distance of 50 m from the plot center. In 2003, our efforts had been associated with comparing data (obtained from 73 plots [where sequential plots were approximately 200 m apart]) among three different transect types (one unburned and two burned [with and without reseeded]). In fall 2003, one of our transects (in a burned area) was salvage logged. Therefore, in 2004, we collected data to initially quantify the possible effects of such salvage logging on breeding bird populations by completing point count censuses in the salvage-logged area, and we compared these data to data simultaneously obtained from a nearby, burned transect that was not salvage logged. Mean species diversity and mean species richness differed significantly between the two sites with both of these variables greater in the site not salvage-logged. However, mean number of individuals observed within 50 m of the plot centers did not differ significantly between the two sites. Also, several species differed in their use of the salvage-logged plots compared to the not salvage-logged plots. R 1100-1115
- 75 A 33-YEAR STUDY OF AVIAN POPULATION TRENDS AT TWO COASTAL STOPOVER SITES IN RHODE ISLAND. **PETER W. C. PATON** and Jason E. Osenkowski, Dept. Natural Resources Science, Univ. Rhode Island, Kingston RI 02881. Long-term trend estimates used to develop conservation priorities for North American birds are based primarily on the Breeding Bird Survey (BBS). However, the BBS provides imprecise trend estimates for many species, particularly boreal birds. Rich *et al.* (2004) reported that current large-scale monitoring programs inadequately monitored the population trends of 49% of the passerines breeding in North America. One approach to filling the gaps in coverage is to monitor songbirds at stopover sites at banding stations. However, few studies have compared long-term population trends between adjacent stopover sites to validate this approach. We compared long-term (1969-2001) population trends between Kingston Wildlife Research Station (KWRS) and Block Island Banding Station (BIBS). At KWRS, significant linear declines were detected in 50% of long-distance migrants, 64% of short-distance migrants, and two mixed-distance migrants, while at BIBS significant linear declines were detected in 91% of long-distance migrants, 45% of short-distance migrants, and neither mixed-distance migrant. No species showed significant opposite linear trends between banding stations, but 46% species showed significant linear trends at one station and non-significant trends at the other station. Actual annual indices were correlated in 69% of species, while de-trended indices were significantly correlated in 38% of species. Some of the variation in trend estimates between stations may be due to differences in changes in vegetation structure at each station. When population trend at KWRS and BIBS were compared to BBS results for southern and northern New England, population declines were much greater for banding station estimates than BBS estimates. These results suggest that trend estimates from adjacent banding stations are variable, thus multiple banding stations need to be monitored to assess regional population trends. F 1530-1545
- 76 USING A COLORIMETER TO ASSESS VARIATION IN THE PLUMAGE COLORATION OF THE WILLOW FLYCATCHER. **EBEN PAXTON** and Caroline Causey, USGS Colorado Plateau Research Station, Flagstaff, AZ 86011; Thomas Koronkiewicz, SWCA Environmental Consultants, Flagstaff, AZ 86001; Mark Sogge and Mathew Johnson, USGS Colorado Plateau Research Station, Flagstaff, AZ 86011; Mary Anne McCloud, SWCA Environmental Consultants, Flagstaff, AZ 86001. We present a preliminary analysis evaluating the potential of using a Minolta S 1330-1345

Colorimeter to quantify plumage coloration variation in the Willow Flycatcher. A colorimeter is a device that measures the color of an object, such as a bird's plumage, and produces a standardized value that can be used for statistical analysis. Over the 2004 breeding season, we captured and measured 93 Willow Flycatchers from seven sites and three subspecies, and measured the plumage coloration on the head and the back. Although the resulting dataset was limited in terms of geographic distribution and sample size, preliminary analysis reveals that the colorimeter can detect substantial plumage variation within the Willow Flycatcher subspecies, and significant differences among the subspecies. Furthermore, preliminary modeling suggests colorimeters have the potential to be a powerful tool in assigning subspecies status to individuals of unknown origin (*i.e.*, migrants, wintering flycatchers), but additional sampling is needed before it can be used for this purpose.

- 77 POWER TO DETECT TRENDS IN MARBLED MURRELET BREEDING POPULATIONS USING AUDIO-VISUAL AND RADAR SURVEYS. **DAVID BIGGER**, SCOPAC, Scotia, CA 95501; M. Zachariah Peery, University of California, Berkeley/Moss Landing Marine Laboratories, Moss Landing CA 95039; J. Baldwin, USDA-Forest Service, Pacific Southwest Research Station, Berkeley, CA 94701; Sal Chinnici, SCOPAC, Scotia, CA 95501; Steven P. Courtney, Sustainable Ecosystems Institute, Portland OR 97201. We used pilot data collected in 2001-2004 to compare the power of radar and audio-visual survey approaches to detect trends in breeding population size and differences in trends between breeding populations of marbled murrelets in northwestern California. Audio-visual counts were much more variable than radar counts overall (CV = 1.10 versus 0.41) and within survey sites (CV = 0.94 versus 0.23). Power to detect trends was considerably greater for the radar than for the audio-visual method. For example, relatively small (2.5%) annual declines could be detected in 10 years with reasonable power (>80%) by surveying 22 radar sites 4 times per year. To achieve an equivalent level of power, 40 audio-visual sites would need to be surveyed 4 times per year. A monitoring program designed to detect differences in trends between breeding murrelet populations required greater survey effort than a program designed to detect overall trends. The estimated annual cost of achieving equivalent power was similar between survey methods. Power to detect trends in murrelet breeding populations was most sensitive to the duration of the monitoring program and the magnitude of the trend; only relatively modest gains in power were realized by increasing the number of surveys or sites. Given that power to detect trends and differences in trends was lower for audio-visual than radar surveys and radar counts reflected annual changes in breeding population size, we recommend the use of radar to monitor marbled murrelet breeding populations and to estimate the effect of land management on local breeding populations. F 1445-1500
- 78 AGE RATIOS AS ESTIMATORS OF PRODUCTIVITY: ASSUMPTIONS AND APPLICATIONS TO MARBLED MURRELETS. **M. ZACHARIAH PEERY**, Moss Landing Marine Laboratories, Moss Landing CA, 95039; Benjamin H. Becker, Point Reyes National Seashore, Point Reyes, CA 94956; Steven R. Beissinger, University of California, Berkeley, CA, 94720. Estimating age-ratios provides a potentially useful approach for characterizing the reproductive success of avian species with nests that are difficult to monitor, but assumptions associated with using age ratios in this context are often not tested. In this study, we used at-sea surveys and captures in the breeding season to estimate the ratio of juvenile to after-hatch-year Marbled Murrelets (juvenile ratio) in central California from 1995-2003. In particular, we (1) use radio-telemetry to evaluate assumptions associated with using juvenile ratios as estimators of productivity; (2) compare contemporary juvenile ratios to historic juvenile ratios estimated from museum collections and to ratios estimated for other bird species; and (3) relate annual variation in juvenile ratios to prey availability and oceanographic conditions. Juvenile and after-hatch-year Marbled Murrelets had similar distributions along the coast and with respect to distance to shore indicating that juveniles did not congregate in "nursery" areas as has been reported in other regions. Radio-telemetry and seasonal changes in density indicated that emigration by after-hatch-year murrelets out of the at-sea survey area did not result in an appreciable bias in juvenile ratios, although results for juveniles were not conclusive. Date-corrected juvenile ratios were very low for both surveys and captures (mean = 0.036, SE = 0.011,  $n = 56$  surveys and mean = 0.037, SE = 0.030,  $n = 220$  individuals, respectively) and were significantly lower than ratios estimated from museum specimens collected in central California from 1892 to 1922 (0.462, SE = 0.066,  $n = 57$  individuals) and ratios predicted from allometric relationships for 24 other bird species (0.336, SE = 0.144). Annual estimates of juvenile ratios were strongly and positively correlated with the Northern Oscillation Index (*i.e.*, cool water conditions), rockfish abundance, and krill abundance. Reproductive success for Marbled Murrelets in central California appears to have declined markedly over the past century, likely due to increases in nest predator populations and possibly at-sea conditions. Global climate change and associated warming of the California Current system would likely decrease the availability of murrelet prey, further reducing murrelet reproductive success. F 1430-1445
- 79 PLASTICITY IN NEST SITE SELECTION IN RESPONSE TO NEST PREDATORS: MANIPULATIVE EXPERIMENTS WITH ORANGE-CROWNED WARBLERS. **\*SUSANA PELUC**, Biology Dept., Univ. of California, Riverside, CA, 92507; T. Scott Sillett, Smithsonian Natl. Zool. Park, Migratory Bird Ctr., Washington, DC 20008; John R. Rotenberry, Biology Dept., Univ. of California, Riverside, CA 92507. We examined the importance of nest predation in shaping nest site selection in an open-cup nesting species, the Orange-crowned Warbler (OCWA hereafter). Nest predation is the major cause of reproductive failure for most open-cup nesting passerines. Selection should thus favor individuals who select safe nest sites and minimize their risk of nest predation. Ground nests usually face the lowest risk of predation, and species with flexible nest site choices should select the safest nesting stratum (*e.g.*, ground instead of shrubs). In contrast to almost all other *Vermivora* breeding on mainland North America which are exclusively ground-nesters, OCWAs endemic to the California Channel Islands nest at variable heights (0-5 m), and breed in areas with few avian predators. We tested if the potential risk of nest predation influences nest site selection in OCWA breeding on Santa Catalina Island. We exposed 36 OCWA pairs to vocalizations and mounts of either Western Scrub-Jays (nest predator absent from the Island), House Finches (non-predator), or no decoy (control). We conducted the experiment on days when females were prospecting for nest-sites, but before they started nest building. OCWA exposed to the avian predator cues were expected to nest on the ground (safer stratum) relative to the non-predator or control birds, if nest site selection was influenced by predator presence. Nest heights differed significantly among treatments (Kruskal-Wallis  $X^2=11.389$ ,  $df=2$ ,  $P=0.003$ ). All females exposed to jays built nests on the ground. Nest heights of females exposed to finch presentations did not significantly differ from control females. The shift in nest site selection observed in OCWAs constitutes a potentially adaptive response to predator presence and provides R 1430-1445

convincing evidence that birds can recognize not only potential risks but also change their nesting behavior in a short time.

- 80 TWO BIRDS IN ONE NET: RESEARCH AND EDUCATION AT MIST-NETTING STATIONS. **MELISSA PITKIN**, Klamath Bird Observatory, PO Box 758, Ashland, OR 97520 and Department of Biology, Southern Oregon University, 1250 Siskiyou Boulevard, Ashland, OR 97520. Directly involving the public with scientific monitoring and research bridges the gap between scientists and the public. In addition to providing valuable scientific information on bird populations, mist netting presents a unique opportunity to demonstrate science-in-action to a wide variety of audiences. Based on feedback from 25 organizations that band birds in North America, I identified challenges researchers and educators face when incorporating education with mist netting. Challenges include; volume of birds caught, number of staff, site accessibility, funding, and added stress from public visitors. Solutions and strategies for safely and effectively involving the public in mist-netting demonstrations include conducting extensive pre-visit planning, implementing staff hiring and training guidelines, developing a plan for bird and human safety, using interpretive tools and supplementary activities, and acquiring adequate funding. Constant effort mist netting and MAPS programs should engage the public whenever possible. The recommendations from this presentation will be summarized into a manual for incorporating public participation in research programs. S 1045-1100
- 81 ABUNDANCE, NEST SUCCESS, AND NEST SITE SELECTION OF WARBLING VIREOS ACROSS AN ELEVATIONAL GRADIENT IN THE SOUTHERN SIERRA NEVADA. **KATHRYN L. PURCELL**, USDA Forest Service, Pacific Southwest Research Station, Fresno, CA 93710; Sylvia R. Mori, USDA Forest Service, Pacific Southwest Research Station, Albany, CA 94701. Recent studies have shown that Warbling Vireos are declining in California and that these trends are due to low reproductive success. From 1985 through 2002 we studied the abundance and productivity of Warbling Vireos over an altitudinal gradient in four forest types in the southern Sierra Nevada: ponderosa pine, mixed conifer, true fir, and lodgepole pine. Warbling Vireos were most abundant in mid-elevation mixed conifer sites. Compared to other populations studied in California and the western United States, nest success was high overall (52%,  $N = 83$ ), especially in mixed conifer habitat (58%,  $N = 58$ ). We examined correlates of nest success for Warbling Vireos using the logistic exposure method and AIC model selection procedures. Nest success was highest in mid-elevation mixed conifer sites in the center of their distribution and lower at both lower and higher elevations. Models that included nest tree height and nest height were supported; higher nests built in taller trees were more successful. Compared to available trees, Warbling Vireos selected larger trees for nesting. In contrast to previous studies, we did not find that brood parasitism by Brown-headed Cowbirds was a significant factor in Warbling Vireo productivity in mid- to upper-elevation forests, although brood parasitism in low-elevation ponderosa pine forests was high enough to be of concern. In mid-elevation mixed conifer forests, the longer breeding season, the possibility of multiple nesting attempts, and high nest success and productivity suggest a self-sustaining population. Warbling Vireos were most productive where they were most abundant and habitat variables important to nest survival coincided with those selected as nest sites, suggesting that Warbling Vireos are able to correctly assess habitat quality. S 1045-1100
- 82 USE OF LIVE FENCES BY BIRDS IN A SUBANDEAN RURAL LANDSCAPE: IMPLICATIONS FOR CONSERVATION. **JIMENA PUYANA** and Luis Miguel Renjifo, Dept. Ecología y Territorio, Univ. Javeriana, Transv. 4 # 42-00 Piso 8, Bogotá, D. C., Colombia. Extensive tropical forests transformation into rural landscapes makes it crucial to understand the role of different landscape elements to conserve native species, in highly transformed regions. Live fences have been proposed as small-scale corridors to enhance functional connectivity. Yet, their actual use by native birds in tropical landscapes is poorly understood. We sampled birds in 18 planted live fences differing in plant composition and landscape location, at Salento, a sub-Andean locality in Colombia. We found 53 bird species at those fences. Floristic composition, and bird species richness in the matrix were the factors contributing the most to explain bird diversity at fences. Other factors such as vegetation height, basal area, and distance to remnant forest were no related to species richness. However, connection to forest fragments was the main factor influencing bird movement along fences. Over half of those bird species present at fences came from the original forest, used fences on a regular basis, and moved along them to reach different landscape elements. Therefore, live fences used as landscape management tools have the potential to increase retention of native bird species in highly transformed regions, especially if they are managed to achieve this purpose. F 1630-1645
- 83 FORAGING RESPONSE OF BARK-GLEANING BIRDS AND THEIR PREY TO EXPERIMENTAL FOREST MANIPULATIONS IN NORTHERN CALIFORNIA. **\*CHRISTOPHER J RALL**, Dept. Wildlife, Humboldt State Univ., Arcata, CA 95521. Changes in forest structure and disturbance regimes have likely changed wildlife populations using western coniferous forests. The response of bark-foraging birds to forest restoration strategies of thinning and prescribed fire is likely a direct result of changes in nest site availability and/or food availability caused by the change in forest structure and disturbance regime. While many woodpeckers forage heavily on newly recruited snags, bark-foragers such as White-headed Woodpecker, Brown Creeper and White-breasted Nuthatch forage primarily on live trees, and thus rely on snags only for nesting. I investigate differences in prey availability for these three birds in an experimental forest setting with recently burned and unburned eastside pine forest of similar open structure, as well as nearby "control" plots of fire-suppressed dense forest. I also investigate the role solar radiation plays on prey abundance and distribution, and whether this plays any part in prey availability to the three focal species. The study site, located in the Goosenest Adaptive Management Area, was established in 1996 to test three different management approaches to restoration of interior ponderosa pine forest. Arthropod sampling was conducted on the boles of live trees where all three focal species are known to primarily forage. Foraging observations were used to identify microhabitats used by the study species and also to measure activity rate. Because it investigates the response of an important guild of birds and the mechanisms underlying that response, this study should have implications for management of western coniferous forests. R 1400-1415

- 84 COMPARISON OF PREDATORS AND PREDATION RATES BETWEEN NATURAL AND ARTIFICIAL SWAINSON'S THRUSH NESTS. **\*REBECCA PIERCE RALL**, Dept. Wildlife, Humboldt State Univ., Arcata, CA 95521. I compared nesting success and nest predators between real Swainson's Thrush nests and artificial nests, to examine whether artificial nests accurately represent the predation risks to real nests. I compared the nesting success of real nests with artificial nests that were paired with each real nest to closely mimic the real nest. I also compared nesting success of real nests with artificial nests that were set up along transects as is typical of many artificial nest studies. I monitored Swainson's Thrush nests in 2001-2003 in coast redwood forests of Humboldt County, California. For each nest found, I placed an artificial nest approximately 10m away from the real nest at a similar distance to edge. In 2002 and 2003, I also set up transects of artificial nests to represent a typical artificial nest study. Nests were monitored for predator activity using video cameras and still cameras. I compared daily survival rate and predator species between the three types of nests. There was a significant interaction between nest type and plot ( $X^2=26.41$ ,  $df=8$ ,  $P=0.0009$ ). The plot that had the highest nesting success for artificial nests had the lowest success for real nests. There was also a significant interaction between nest type and year ( $X^2= 13.39$ ,  $df= 7$ ,  $P= 0.0631$ ). Artificial nests did not track year-to-year differences in nesting success of the real nests. Causes of nest failure differed between the different types of nests. The most common cause of failure for the artificial nests was "pecking", where small holes were left on top of the eggs. Deer mice recorded at nests left holes typical of these pecked eggs. Since this pattern was not seen on any of the real nests, the identification of mice as important primary nest predators may be an artifact of artificial nest studies. Conclusions drawn from artificial nest studies should be viewed with skepticism, and their further use in studies of nesting success is not recommended. F 1600-1615
- 85 PREDICTING ABUNDANCE OF MARBLED MURRELET NESTING PLATFORMS FROM TREE DIAMETER. **MARTIN G. RAPHAEL**, USDA Forest Service, Pacific Northwest Research Station, Olympia WA 98512. The Marbled Murrelet is a seabird in the alcid family that forages in coastal marine waters but nests on limbs of large coniferous trees. It is federally listed as Threatened and is a focal species whose conservation was an important feature of the Northwest Forest Plan. Under that plan, much effort has been focused on monitoring habitat conditions and populations of this bird. One of the key features of nesting habitat is the abundance of suitable nesting platforms, defined as limbs >10 cm diameter or limbs with moss or mistletoe. Platform data is not routinely gathered as part of ongoing forest inventories, so a proxy to platform abundance is needed. I explored using tree diameter and species to predict platform abundance in forests of Washington. Observers counted platforms and measured diameters of 13,822 trees in 68 plots. Using logistic regression, I found a very strong correlation between tree diameter and the occurrence of platforms; this relationship differed among tree species. Among all species, individual trees with >100 cm DBH had a 50% or greater likelihood of having platforms. At the stand level, total number of platforms increased with quadratic mean diameter (QMD) of stands up to about 75 cm QMD; platform density was variable among stands, probably reflecting the mix of species present and occurrence of moss and mistletoe. These results indicate that commonly measured stand attributes may be used to predict potential suitability of murrelet nesting habitat. S 1430-1445
- 86 SAGEBRUSH BIRD POPULATION CHANGES IN SOUTH-CENTRAL IDAHO – 1981-2004. **TERRELL D. RICH**, USFWS, Boise, ID 83709. In 1981, I established line transects in the sagebrush steppe of south-central Idaho to assess densities of breeding birds in three habitat types - big sagebrush, three-tip sagebrush, and cheatgrass. Data were collected 1981-1984. In 2002, 2003, and 2004, I reread these transects to examine possible changes in the breeding bird community over time. Brewer's Sparrow was the most common species in all years, and it showed a modest but significant decline from 1981 to 2004. Western Meadowlark and Horned Lark increased significantly while Sage Thrasher and Vesper Sparrow showed no trend. Over the same period, Brewer's Sparrow population trends in Idaho and in the Columbia Plateau were more strongly downward than in the study area. Meadowlark trends were significantly downward in both of these larger regions, and Horned Lark trends were significantly downward in the Columbia Plateau. Thrashers and Vesper Sparrows show no trends at the larger scales. Although portions of the study site burned at various times since 1981, the only component of the vegetation that was significantly different was the cover of rabbitbrush, which declined over the study period. In conclusion, populations of the most common birds seem to be doing better in the study area than in Idaho and the region. I propose that this is a result of 1) the resiliency of three-tip sagebrush, which re-sprouts after burning, 2) a lack of cheatgrass invasion, 3) a large and unfragmented study area, and 4) improved livestock management. Three-tip sagebrush communities are little studied but may represent a portion of the sagebrush ecosystem that can be more readily conserved into the future. Greater Sage-Grouse use three-tip sites but Sage Sparrows apparently do not. F 1100-1115
- 87 TAKING ADVANTAGE OF RECENT IMPROVEMENTS IN NEST-SURVIVAL MODELING AND IDENTIFYING FURTHER USEFUL IMPROVEMENTS. **JAY ROTELLA**, Ecology Department, Montana State University, Bozeman, Montana, 59717. Estimating nest success and evaluating factors potentially related to the survival rates of nests are key aspects of many studies of avian populations. A strong interest in nest success has led to a rich literature detailing a variety of estimation methods for this vital rate. In recent years, modeling approaches have undergone especially rapid development. A variety of methods now exist that allow researchers to rigorously assess the importance of a variety of biological factors that might affect nest survival rates. The most notable improvements of the various methods will be summarized and briefly discussed. In addition, the advantages and disadvantages of different modeling approaches for some commonly encountered research scenarios will be considered. Finally, I will discuss improvements that would, if they became available, promote a better general understanding of nest-survival rates.

- 88 AN EVALUATION OF FLUCTUATING ASYMMETRY AS A TOOL IN IDENTIFYING IMPERILED BIRD POPULATIONS. **JAMES ROURKE**, Biology Dept., San Diego State Univ., San Diego, CA 92182; Barbara Kus, USGS Western Ecological Research Center, 5745 Kearny Villa Road Suite M, San Diego, CA 92123; Douglas Deutschman, Biology Dept., San Diego State Univ., San Diego, CA 92182. Fluctuating asymmetry has been shown to increase in organisms exposed to environmental and/or genetic stress, generating discussion of its possible use as a conservation tool in monitoring "stress" in population/species. We studied tarsus and bill length fluctuating asymmetry in five species of riparian obligate birds to investigate associations between a species level of endangerment and fluctuating asymmetry expression. Species ranged in Federal/State conservation status from endangered (Least Bell's Vireo and Southwestern Willow Flycatcher) and sensitive (Yellow-breasted Chat) to abundant (Song Sparrow and Common Yellowthroat). Historic fluctuating asymmetry levels for each species were derived from museum skins collected between 1887 and 1938 in southern California. Contemporary asymmetry levels were derived from sampling live birds between 22 April 2002 and 14 July 2003 within the same region. Contemporary bill fluctuating asymmetry levels of the Southwestern Willow Flycatcher were significantly greater compared to historic levels. Comparing contemporary and historic Song Sparrow asymmetry indicated that Song Sparrow tarsus asymmetry increased, while bill asymmetry decreased. There was no significant change consistently detected in fluctuating asymmetry levels though time in either trait of the Least Bell's Vireo, Common Yellowthroat, or Yellow-breasted Chat, or in the tarsus of the Southwestern Willow Flycatcher. Contemporary fluctuating asymmetry levels of the two abundant species differed significantly for both the bill and tarsus traits. Results indicated no obvious correlation between a species' State/Federal conservation designation and its fluctuating asymmetry level. F 1530-1545
- 89 AVIAN DIVERSITY, ASSEMBLAGES AND USE OF VEGETATION, MAINLY BY SHRUB-NESTERS, IN AN URBAN ECOSYSTEM. **JOSÉE ROUSSEAU**, P.O. Box 4635, Arcata, Ca, 95518; Jean-Pierre Savard, Canadian Wildlife Service, Environment Canada, 1141 route de l'Église, Box 10100, 8e étage, Sainte-Foy, Qc, G1V 4H5; Rodger Titman, McGill University, 21111 Lakeshore, Ste-Anne-de-Bellevue, Qc, H9X 3V9. Urbanization is known to have a negative impact on biodiversity. However, it is possible to increase bird species richness in cities through local actions such as increasing vegetation density and diversity. My first objective was to compare bird density and diversity on the island of Montreal among four urban habitat types: low-density and medium-density residential sectors, and residential and natural parks. A second objective was to determine the presence of bird species assemblages within these four urban habitats and a third was to explore associative relationships among six mainly shrub-nesting bird species and the vegetation they use. Point counts were conducted in each of 103 locations. Environmental variables measured consisted of the type (coniferous *versus* deciduous), density and height of vegetation within each 1ha sector. Results revealed a decrease in bird abundance from medium-density residential habitats, residential park, low-density residential habitats to natural parks and an increase in diversity from medium density residential habitats, low-density residential habitats, to residential parks to natural parks. Bird assemblages were determined through correspondence analysis. Most bird species were associated with at least one type of urban habitat. Associations between bird species and vegetation were measured through canonical correspondence analysis. The six focal species associated with shrubs demonstrated different levels of association with different habitat variables. S 1445-1500
- 90 PREDATION AND NEST SUCCESS OF FOREST BIRDS IN NATIVE AND NON-NATIVE HABITAT ON SAIPAN, MARIANA ISLANDS. **THALIA SACHTLEBEN** and Julie A. Savidge, Dept. Fishery and Wildlife Biology, Colorado State Univ., Fort Collins, CO 80523. Two key threats to native wildlife are introduced species and habitat loss and alteration. Both may affect the nesting success of native birds on Saipan, Mariana Islands. Several exotic species that may prey on nests have been introduced to the Mariana Islands. In addition, 77% of remaining forest on Saipan is non-native, with native forest estimated to cover only 5% of the island. We assessed the impact of non-native forest and introduced species on the nest survival of three focal birds, Golden White-eye, Bridled White-eye, and Rufous Fantail. We quantified nest densities, determined daily survival rates, and identified nest predators using cameras in four native and four non-native forest sites in 2003 and 2004. A total of 437 nests were monitored over both years. Estimated nest densities ranged from 0-115/km<sup>2</sup> in non-native forest and 0-41/km<sup>2</sup> in native forest. Nest densities were influenced by forest type in 2003, and by avian species, forest type, and sampling period in 2004. Daily nest survival rates varied by nest stage and species. In 2003, daily nest survival in all stages for Bridled White-eyes was similar to that of Golden White-eyes and Rufous Fantails. Survival estimates were higher for Golden White-eyes and Rufous Fantails than for Bridled White-eyes in the incubation and nestling stages in 2004. All predators identified by camera were avian, predominantly Micronesian Starlings and Collared Kingfishers. R 1615-1630
- 91 PATTERNS OF TEMPORAL VARIATION IN GOSHAWK PRODUCTIVITY AND PREY RESOURCES. **SUSAN R. SALAFSKY**, Graduate Degree Program in Ecology, Colorado State University, Fort Collins, CO 80523; Richard T. Reynolds, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO 80526; Barry R. Noon, Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, CO 80523. To investigate if Northern Goshawk reproduction is food-limited, we evaluated the annual reproductive output from 103 goshawk territories on the Kaibab Plateau, Arizona, during 1999-2002. Concurrently, we estimated annual and seasonal densities of 10 goshawk prey species (7 bird, 3 mammal) using distance sampling. We then assessed the relationship between goshawk productivity (number of fledglings produced) and prey density within and among years by relating the contribution of individual prey species and total prey density to goshawk productivity. We also estimated the proportion of total diet and biomass for those species that contributed  $\geq 3\%$  of all prey items collected from goshawk nest sites. Total prey density explained 98% of the variation in goshawk productivity. Red squirrel density, biomass, and their proportion of total goshawk diets accounted for more annual variation in goshawk productivity than any other species. Even though goshawks on the Kaibab Plateau will readily switch to alternate prey species, goshawk productivity showed significant inter-annual variation. Our results suggest that the magnitude of goshawk productivity was determined by total prey density and annual variation is driven by yearly differences in the densities of critical prey species. F 1130-1145

- 92 **HABITAT AND SPATIAL VARIABILITY IN CALIFORNIA SPOTTED POPULATION VITAL RATES. MARK SEAMANS** and Rocky J. Gutiérrez, Dept. Fisheries, Wildlife, & Cons. Biol., Univ. Minnesota, St Paul, MN 55108. The California spotted owl has received a great deal of attention recently due to the large role it played in the development of public land management plans in the Sierra Nevada. The attention it garnered was mainly due to uncertainty regarding how habitat influences owl population processes. Although this subspecies apparently exhibits many of the same habitat affinities as the northern spotted owl, it has generally been assumed it uses a wider variety of habitats. We used a 15-year data set to examine the relationship between population vital rates and habitat at the territory scale in the central Sierra Nevada. We used maximum likelihood estimation to model annual survival, reproductive output, and site colonization and extinction probabilities in relation to time varying individual habitat covariates. We used an information theoretic approach to rank competing models. Overall, habitat was a poor predictor of reproductive output and a good predictor of survival. The total amount of forest with high (>70%) canopy cover and medium (30.4 - 60.9 cm dbh) and large (>61 cm dbh) trees, and the amount of interior forest with these same attributes, were good predictors of survival and site colonization (positive relationship), and site extinction (negative relationship). In addition, survival was negatively related to the amount of hardwood forest, and reproductive output was negatively related to the number of distinct patches of hardwood forest. Using a variance components analysis, our estimate of spatial variability in reproductive output (CV = 0.19) was about what we expected, but was quite large for survival (CV = 0.34). Habitat metrics explained 36 and 93% of the spatial variability in reproductive output and survival, respectively. Our results suggest that, although spotted owls can be found living in a variety habitats, in the central Sierra Nevada forests with high canopy cover comprised of medium and large timber promote the highest site occupancy rates and highest individual survival rates. S 1400-1415
- 93 **EFFECTS OF PRESCRIBED BURNING ON BIRD COMMUNITY COMPOSITION IN CONIFEROUS FOREST OF NORTHERN CALIFORNIA. NATHANIEL E. SEAVY**, Dept. of Zoology, Univ. Florida, Gainesville, FL 32611 and Klamath Bird Observatory, Ashland, OR 97520; John D. Alexander, Klamath Bird Observatory, Ashland, OR, 97520. The effects of prescribed burning on bird community composition in coniferous forests of the Pacific Northwest are not well documented. To address this information need, we collaborated with the Klamath National Forest in northern California to evaluate the effects of prescribed fire on bird communities. Over a 5-year period, we quantified bird community composition at 5 sites where prescribed burning was applied to reduce fuels. Our results suggest that prescribed burning had relatively little effect on the passerine bird community. Using ordination, we show that pre-existing spatial variation and annual variation appear much more dramatic than changes induced by prescribed burning. Of the 20 most abundant species, only Nashville Warbler and Townsend's Solitaire consistently declined in abundance as the proportion of area burned increased. Based on these results, we cautiously suggest that under some conditions prescribed fire may be used to reduce fuels without major effects on passerine bird community composition. R 1330-1345
- 94 **LOGISTIC-EXPOSURE MODELS FOR AVIAN NEST SURVIVAL AND NEST PARASITISM RATES. TERRY L. SHAFFER**, U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, ND 58401; Todd A. Grant, U.S. Fish and Wildlife Service, J. Clark Salyer National Wildlife Refuge, Upham, ND 58789. Logistic regression models for nest fate are inappropriate when applied to data from nests found at various ages for the same reason that the apparent estimator of nest success is biased (i.e. older clutches are more likely to be successful than younger clutches). We describe a generalized linear model that is appropriate when exposure periods vary, as they usually do. This model (the logistic-exposure model), unlike Mayfield's method and survival time analysis (e.g. Cox regression, Weibull regression), requires no assumptions about when nest losses occur. Logistic-exposure models involving continuous and categorical explanatory variables, multi-way classifications, time-dependent variables such as nest age or Julian date, and random effects are easily implemented in SAS. The model likelihood accommodates nests found at different stages in the nesting cycle and nests whose ultimate outcomes are never observed. We illustrate how the model can be used to assess the influence of various factors on nest survival, and to provide unbiased estimates of nest success when survival rates are non-constant. We illustrate use of random and nested effects to properly account for stratified and multi-stage sampling designs. We demonstrate the potential of the logistic-exposure method to advance knowledge of avian biology by presenting an analysis of Clay-Colored Sparrow nest survival in which we modeled brood parasitism as a time-dependent variable. The logistic-exposure model provides ornithologists with a powerful alternative to traditional constant-survival methods. An attractive feature of the logistic-exposure model is its similarity to logistic regression; biologists familiar with logistic regression will have little difficulty implementing and understanding results of logistic-exposure models. F 1415-1430
- 95 **NEST PREDATION RISK FACTORS FOR THE SPOTTED TOWHEE IN A RIPARIAN RESTORATION CONTEXT. STACY L. SMALL**, Div. Biological Sciences, Univ. Missouri, Columbia, MO 65211; Frank R. Thompson III, USDA Forest Service, Univ. Missouri, Columbia, MO 65211; David Galat, Dept. Fisheries and Wildlife, Univ. Missouri, Columbia, MO 65211; Geoffrey R. Geupel, PRBO Conservation Science, Stinson Beach, CA, 94970; John R. Faaborg, Div. Biological Sciences, Univ. Missouri, Columbia, MO 65211. Nest predation was the primary cause of nest mortality for Spotted Towhees along the Sacramento River, California, during 1993 -2003, followed by cowbird parasitism. We documented nest predation events using time-lapse infrared video cameras during 2001-2003. Most of the nest predators we documented, including the Brown-headed Cowbird, rodents, and raccoon, are associated with agriculture and human habitation. We investigated factors at multiple scales that potentially influence nest predation risk in the region, within the context of large-scale riparian habitat restoration. We used the logistic-exposure method and AIC model selection procedures to compare predator search, predator abundance, restoration, and seasonal effects hypotheses. Our models contained covariates that represented nest activity, nest site, restoration, landscape composition (per cent agriculture at 50 and 500 meter scales), seasonal, and flood effects, as well as a random effect of plot and year. Our best-supported models contained cowbird young and date. F 1415-1430

- 96 CASCADING EFFECTS OF HUMAN LANDSCAPE FRAGMENTATION: BEHAVIORAL RESPONSES TO BLACK-BILLED MAGPIES. **COURTLAND M. SMITH** and Douglas G. Wachob, Conservation Research Center, Jackson WY 83002. Habitat fragmentation is often cited as one of the largest contributors to recent declines in terrestrial bird populations. Few studies, however have attempted to quantify the cascading biological effects of habitat fragmentation (*i.e.*, how fragmentation may impact a certain species which may, in turn, exert influences on conspecifics). In this study, we demonstrated how direct demographic effects of fragmentation on a single species can translate into altered behavior of other species. Using decoys and magpie vocalization playbacks, we measured bird community response (time of initial response to stimuli, number of individuals and species responding, and intensity of response) in areas with varying degrees of human landscape occupation, fragmentation, and presence of a fragmentation-tolerant, synanthropic species, the Black-billed Magpie. Results from our study indicated that birds living within highly fragmented riparian forests with correspondingly high magpie abundances exhibited different behaviors to standardized playback treatments. Birds living in areas with high abundances of magpies tended to respond more intensely and in greater numbers to our playbacks than birds occupying patches with little or no magpie presence. From this, we infer that magpie presence in highly fragmented landscapes elicits more intense defensive behavioral responses, possibly due to the fact that these birds have had negative interactions with magpies. These behavioral interactions represent an intriguing cascading effect of habitat fragmentation and suggest that the effects of fragmentation may be more complex than mere spatial alterations of a landscape. R 1345-1400
- 97 IMPACTS OF NON-NATIVE INVASIVE PERENNIAL PEPPERWEED ON BREEDING BIRD DISTRIBUTION AND REPRODUCTIVE SUCCESS IN SAN FRANCISCO BAY TIDAL MARSHES. **HILDIE SPAUTZ**, PRBO Conservation Science, Stinson Beach, CA 94970 and Wetlands Wildlife Associates, El Cerrito, CA, 94530; Nadav Nur, PRBO Conservation Science, Stinson Beach, CA 94970. Extensive habitat loss and degradation have resulted in decreases in populations of tidal marsh breeding birds in the San Francisco Estuary. The spread of non-native plants such as perennial pepperweed has the potential to further impact sensitive bird species by changing ecological relationships including food availability and concealment from predators. To quantify some of these potential impacts, we examined the relationship of pepperweed cover (and a suite of potentially related habitat and landscape characteristics) to breeding bird abundance or presence at over 50 tidal marshes throughout the estuary in 2000 and 2001. Then, to determine whether pepperweed has the potential to alter reproductive output of breeding populations, we examined the relationship between tidal marsh Song Sparrow nest survivorship and pepperweed cover at 5 marshes in San Pablo and Suisun Bays from 1996 to 2003. There was a strong positive association between pepperweed and Common Yellowthroat presence. For other species examined there was no relationship with pepperweed. However, we stress that we have not examined all potential direct and indirect impacts (e.g., food availability and winter survival) and that the impacts on the endangered California Clapper Rail are entirely unknown. We recommend further studies in these areas. F 1045-1100
- 98 DISPERSAL AND RECRUITMENT IN A DECLINING METAPOPOPULATION: THE MEXICAN SPOTTED OWL IN WEST-CENTRAL NEW MEXICO. **PETER B. STACEY**, Dept. Biology, Univ. New Mexico, Albuquerque, NM 87131. The Mexican Spotted Owl typically occurs in canyon riparian and adjacent woodland areas in the mountains of the American Southwest and the Sierra Madre of Mexico. Suitable habitat for this species is therefore often highly fragmented and separated by large areas of grassland or desert. Rainfall patterns also are extremely variable, and reproduction and survivorship are subject to highly stochastic processes. The owls show a number of behavioral characteristics that may allow them to cope with both fragmented habitats and stochastic environments. Unlike many resident bird species in the region, all young disperse in their first fall. Juveniles wander over large areas, and rarely return to breed in the same mountain range in which they were born. Owl populations over wide areas are thus connected together into a metapopulation. One consequence is that recruitment into a local population is independent of local reproductive success. When regional reproductive success is high, this allows for the rapid reestablishment of populations that may have declined or gone extinct due to local stochastic events. However, when regional numbers are declining, the behaviors involved in dispersal and recruitment to new breeding locations may actually impede the recovery of local populations. An example of this phenomenon is described for the owls in the Zuni Mountains of west-central New Mexico. S 1145-1200
- 99 SOMEPLACE LIKE HOME: EFFECTS OF NATAL EXPERIENCE ON HABITAT PREFERENCE. **JUDY STAMPS**, Evolution and Ecology, University of California, Davis, Davis, CA 95616. Natal habitat preference induction (NHPI) occurs when experience with stimuli in its natal habitat increases the chances that a disperser will select a post-dispersal habitat containing similar stimuli. This phenomenon has been reported in a variety of taxa, including birds. Theory suggests three mutually non-exclusive explanations for NHPI: experience in the natal habitat improves a disperser's 1) performance in the same type of post-dispersal habitat, 2) estimate of the quality of the same type of post-dispersal habitat, and/or 3) ability to recognize suitable habitats while searching for a new habitat. NHPI has interesting implications for problems in conservation biology, especially those whose goal is to induce dispersers to settle in particular patches of habitat. Examples include conservation programs involving captive-release, translocation, or the colonization of empty, restored habitats. R 1145-1200
- 100 A COMPARISON OF BIRD ABUNDANCE AND NESTING IN CLEARCUTS, HABITAT ISLANDS, AND MATURE CONIFEROUS FORESTS IN SOUTHWESTERN OREGON. **\*JAIME L. STEPHENS**, Dept. Biology, Southern Oregon University, Ashland, OR 97520 and Klamath Bird Observatory, Ashland, OR 97520; John D. Alexander, Klamath Bird Observatory, Ashland, OR 97520; Stewart W. Janes, Dept. Biology, Southern Oregon University, Ashland, OR 97520. This study compared bird abundance and nesting to determine whether 0.1 to 1.3 ha habitat islands retained within clear-cuts (Wildlife Protection Areas, WPAs) were effective in providing habitat for birds in the 1 to 3 years post harvest. Two years of point counts revealed that bird abundance in WPAs was more similar to abundance in clear-cuts than mature forests, and that species richness did not differ between clear-cuts, WPAs, and mature forests. Abundance results indicated that WPAs provided habitat for seven of the fifteen species detected in both years; two forest species (Red-breasted Nuthatch and Cassin's Vireo), one edge specialist (Dark-eyed Junco), and four habitat generalists (Western Tanager, Steller's Jay, Yellow-rumped Warbler, and House Wren). Overall, nest-monitoring results showed WPAs provided nesting habitat similar to clear-cuts. Results from both abundance and nesting data S 1100-1115

concur that WPAs are providing habitat for the forest species, Cassin's Vireos and two habitat generalists, Western Tanagers and Yellow-rumped Warblers. Results from this study suggest further investigation is warranted to determine whether larger WPAs would be more effective in providing habitat for forest species.

- 101 MODELING POTENTIAL IMPACTS OF NON-NATIVE SPARTINA SPREAD ON SHOREBIRDS IN SOUTH SAN FRANCISCO BAY. \*DIANA STRALBERG, Viola Toniolo, Gary W. Page, and Lynne E. Stenzel, PRBO Conservation Science, 4990 Shoreline Highway, Stinson Beach, CA 94970. San Francisco Bay holds 70% of California's mudflats and provides habitat to more wintering and migratory shorebirds than any other wetland along the Pacific coast of the contiguous U.S. The Bay's mudflats are currently threatened by *Spartina alterniflora*, and associated hybrids, which grow at lower elevations than the native *S. foliosa* and can render large mudflat areas effectively unavailable to shorebirds for foraging. Using shorebird survey data, tidal benchmark data, and GIS-based habitat data, we analyzed the potential effect of *S. alterniflora* on shorebird habitat in the South Bay, creating grid-based spatial models of shorebird habitat value and potential *S. alterniflora* spread. We developed six potential scenarios of habitat value loss for shorebirds, based on assumptions about the inundation tolerance of *S. alterniflora*, and temporal availability of mudflat resources. *Spartina* spread models predicted that between 14% and 54% of the total South Bay mudflat area could be encroached upon by *S. alterniflora* and associated hybrids. Predictions of habitat value loss for shorebirds ranged from 14% to 80%. We identified the upper mudflats, due to their greater exposure time, and the east and south shore mudflats, due to the high numbers of birds detected there, as the areas of highest value to shorebirds in the South Bay. These areas also coincide with the areas of greatest *Spartina* invasion potential. F 1645-1700
- 102 ARE HAYFIELDS ECOLOGICAL TRAPS FOR GRASSLAND SONGBIRDS? HABITAT SELECTION AND REPRODUCTIVE SUCCESS OF BOBOLINKS AND SAVANNAH SPARROWS IN AGRICULTURAL LANDSCAPES. ALLAN M. STRONG, Rubenstein School of Environment and Natural Resources, Univ. of Vermont, Burlington, VT 05405; Therese Donovan and Noah Perlut, Vermont Cooperative Fish and Wildlife Research Unit, University of Vermont, Burlington, VT 05405; Neil Buckley, Dept. Biological Sciences, SUNY Plattsburgh, Plattsburgh, NY 12901. Grassland songbirds have colonized agricultural habitats in the northeastern U.S.; however, intensification of agricultural practices may lead to sustained population declines. We studied Bobolinks and Savannah Sparrows in the Champlain Valley (VT/NY) to assess whether agricultural landscapes act as ecological traps for these species. Typical hayfield management practices involve a 1 June cut. Bobolinks and Savannah Sparrows respond differently to this early cut with Bobolinks abandoning the field and Savannah Sparrows re-nesting immediately after cutting. Consequently, reproductive success for the two species varies strongly by species and management regime (in early and late cut fields, Bobolink nest success was 0% vs. 67%, number of females fledged/female 0 vs. 1.2 [ $n = 75$ ]; Savannah Sparrow nest success was 42% vs. 67%, number of females fledged/female 1.1 vs. 1.4 [ $n = 145$ ], respectively). We quantified nesting density by conducting point counts in 4 km<sup>2</sup> blocks stratified by the proportion of agricultural habitat in the surrounding landscape (25 km<sup>2</sup>). Density of both species increased as proportion of the landscape in grassland habitat increased to approximately 30% but density decreased in more highly agricultural landscapes. By contrast, the proportion of fields cut prior to mid-July, the earliest cut date for successful Bobolink reproduction, was directly correlated with the proportion of grassland in the landscape ( $r^2 = 0.69$ ). These results suggest that early cut hayfields act as ecological traps for Bobolinks, but not for Savannah Sparrows. Because nearly all marked Savannah Sparrows re-nest in cut fields, most are eventually successful over the course of a breeding season. However, for Bobolinks, post-cutting dispersal will be critical to fully evaluating the ecological trap hypothesis as dispersing individuals have the opportunity to successfully re-nest following an early season cut. R 1530-1545
- 103 COUNTING RAPTORS IN CLASS. KIM SULLIVAN and Amanda Bakian, Dept. of Biology, USU, Logan UT 84322-5305. We were looking for a way to provide a research experience for students in our ornithology class. Cache County, Utah is undergoing rapid conversion of agricultural lands to housing developments. Our class compared raptor counts at alfalfa fields located in areas with housing developments with fields located in areas that have undergone little development. During the winter (January and February) we found significantly fewer raptors in areas near housing developments. We found no differences during spring migration (March and April). We also examined 20 years of Cache County Christmas Count data. More raptors were seen in rural parts of the county and the greatest decline in raptor numbers occurred in the area undergoing the greatest human population increase. A group of students from the ornithology class analyzed the Christmas Count data and worked on a manuscript during the following fall semester. We will discuss the challenges we faced with class based research projects and our insights from the raptor count project and the 2005 class project on dominance in junco flocks. F 1415-1430
- 104 PLASMA METABOLITES OF THREE SHOREBIRD MIGRANTS DURING FALL STOPOVER IN THE MID-CONTINENT. \*NATHAN E. THOMAS and David L. Swanson, Dept. of Biology, Univ. of South Dakota, Vermillion, SD 57069. Shorebirds are some of the longest distance migrants of all birds. Their primary fuel source during migration is fat, which is periodically replenished at stopover sites along the migratory route. We measured plasma metabolites at natural and managed wetland stopover sites in northeastern South Dakota and west-central Minnesota for three shorebird species; Least, Semipalmated and Pectoral sandpipers. We analyzed plasma metabolites associated with fattening (triglycerides) and fat catabolism (glycerol and  $\beta$ -hydroxybutyrate), as well as indicators of muscle damage (creatin kinase), to provide information regarding the suitability of stopover sites. Triglycerides showed a significant positive relationship with energetic condition for Least ( $R^2=0.19$ ,  $P<0.05$ ) and Semipalmated ( $R^2=0.18$ ,  $P<0.01$ ) sandpipers suggesting that enhanced energetic condition was accomplished via fattening at stopover sites. However, triglycerides were non-significantly correlated with energetic condition in Pectoral Sandpipers ( $R^2=0.05$ ). Glycerol was not clearly related to energetic condition for any of the species studied.  $\beta$ -hydroxybutyrate showed a significant negative relationship with energetic condition for Least Sandpipers ( $R^2=0.14$ ,  $P<0.05$ ) and a non-significant negative trend for Pectoral Sandpipers ( $R^2=0.18$ ,  $P=0.07$ ), suggesting that increased energetic condition was associated with reduced fat catabolism. No clear relationship was evident between  $\beta$ -hydroxybutyrate and energetic condition for Semipalmated Sandpipers. Creatine kinase showed a non-significant negative trend with energetic condition for Semipalmated Sandpipers ( $R^2=0.12$ ,  $P=0.09$ ), which suggests that birds repairing muscle during stopover were simultaneously depositing fat. The relationship for Least and Pectoral sandpipers was unclear. Taken together these F 1600-1615



indicators demonstrate that both natural and managed stopover sites in the northern prairie region generally serve as suitable sites for migrating shorebirds. In addition, some between-individual variation might be attributed to age and experience with migration.

- 105 MAKING MEANINGFUL PREDICTIONS OF NESTING SUCCESS FROM LOGISTIC EXPOSURE MODELS AND OTHER MODEL BASED METHODS. **FRANK R. THOMPSON III**, USDA Forest Service North Central Research Station, Columbia, MO 65211-7260. Model based methods to estimate daily nest survival allow the flexibility to predict nest success for any combination of covariate values. Traditional empirical based estimates of nest survival like the Mayfield method produce estimates based on the values of covariates in the sample of nests or observation days, or for some subset of observations (for example those in the nestling stage). Use of model based estimates provides greater flexibility in estimating survival rates but also requires careful consideration of what covariate values should be selected, and if the estimate is to be based on the sample or representative of the population. I present examples of how to produce estimates from logistic exposure models in SAS and the differences between estimates based on the sample covariate values and those more representative of the population. I use examples from our studies of nesting success of field and forest nesting songbirds in the Midwest.
- 106 STOPOVER ECOLOGY AND HABITAT SELECTION OF JUVENILE SWAINSON'S THRUSHES IN NORTHWESTERN CALIFORNIA. \***JAMES TIETZ** and Matt Johnson, Department of Wildlife, HSU, Arcata, CA, 95521. Migration is the most dangerous and unpredictable period of a migratory bird's annual cycle. Since stopover represents the greatest proportion of the migratory phase, selection of appropriate stopover sites and habitats for resting, refueling, and safety from predators is critical to a migrant's success. We used telemetry to investigate stopover habitat selection for juvenile Swainson's Thrushes during fall migration along the Northern California Coast. Since stopover strategies have been shown to differ for fat and lean birds, we examined how the energetic condition of arriving birds affected their decisions. In 2002-03, 29 thrushes were captured and tracked. Of 20 birds with a sufficient number of locations, average length of stay was 10.5 days and average home range size was  $1.9 \pm 0.3$  ha. The home range size of lean birds ( $2.5 \pm 0.5$  ha) was twice that of fat birds ( $1.2 \pm 0.3$  ha). Euclidean distance-based analyses did not show selection of forest type within the study area (2nd order) or to the forest type used inside their home range (3rd order). Furthermore, fatness did not affect forest selection at the 2nd or 3rd order. However, lean birds had twice as much huckleberry shrub cover and 1.3 times more concealment than fat birds at occupied locations. As a measure of food abundance, huckleberry counts ( $n = 22$ ) were conducted which found that occupied plots ( $195.5 \pm 54.6$  berries) had 2.5 times more berries than random plots ( $76.9 \pm 24.2$ ), and lean birds ( $227.4 \pm 79.7$  berries) had 2.9 times more berries than fat birds ( $79.7 \pm 30.9$ ) at occupied plots. Fecal analyses ( $n = 75$ ) revealed that arthropods, huckleberries, and wax myrtle are the most prevalent food items. Regressing mass deposition rate against last mass of thrushes captured over 10 years at the study site suggests a predator avoidance stopover strategy, and that lean birds may be more pressured for time than fat birds. F 1545-1600
- 107 THE CONSERVATION RESERVE PROGRAM AND SHRUBSTEPPE-ASSOCIATED BIRDS IN EASTERN WASHINGTON. **W. MATTHEW VANDER HAEGEN**, Washington Department of Fish and Wildlife, Olympia, WA 98501; Michael A. Schroeder, Washington Department of Fish and Wildlife, Bridgeport, WA 98813. The Conservation Reserve Program (CRP) is currently the only large-scale effort to restore habitat that may be used by grassland and shrub-steppe wildlife in the Columbia River Basin. In Washington, over 1 million acres (405,000 ha) of converted farmland has been planted to non-native grasses and to native grasses, forbs and shrubs under the CRP. In 2003 we began a study to evaluate the potential role of CRP in the long-term conservation of obligate grassland and shrub-steppe birds in the Columbia River Basin. We established 48 study sites (6 "treatments" with 8 repetitions each) in CRP fields of varying age and landscape contexts and in extant shrub-steppe communities. Point-count surveys in 2003 and 2004 revealed bird communities in most CRP sites typified by grassland-associated species; however, sites where sagebrush was planted or had seeded-in from adjacent shrub-steppe often had sagebrush obligates. Mayfield nesting success for Brewer's Sparrows in CRP (0.59,  $n = 128$ ) was similar to that in native shrub-steppe (0.43,  $n = 133$ ). Seasonal reproductive success of color-banded Brewer's Sparrows ( $n = 62$ ) also was similar in CRP and native shrub-steppe with >88% of males pairing and >63% of pairs fledging  $\geq 1$  brood. Pellet-count surveys revealed considerable use of CRP by Greater Sage-Grouse, particularly newer sites planted to sagebrush. A third year of data collection is planned for 2005. We will use results from this research to offer guidance to the CRP program and other habitat restoration activities to benefit shrub-steppe-associated wildlife.
- 108 WEST NILE VIRUS IN SOUTHERN NEW MEXICO: ECOLOGICAL ASSOCIATIONS IN AN ARID ENVIRONMENT. \***HOLLY B. VUONG** and Don Caccamise, Fishery & Wildlife Sciences, NMSU, Las Cruces, NM 88003; Rebecca Creamer, Entomology, Plant Pathology, and Weed Science, NMSU, Las Cruces, NM 88003. West Nile Virus (WNV) appeared in the U.S. in 1999 and rapidly spread throughout the country, reaching New Mexico in 2002. Avian and equine infections were first documented that year, but by 2003 there were 209 human cases with four deaths. With the establishment of this exotic virus, new and unknown associations of hosts and vectors are developing. Identifying these emerging associations is an important part of understanding the ecology of the virus as well as developing effective and efficient management strategies. We are assessing the relative importance in WNV transmission of four key habitats in southern NM (riparian, agriculture, urban, and desert playas). We are testing three key hypotheses related to habitat distribution, seasonal onset of virus cycling, and host competency. We sampled mosquitoes ( $n \sim 2500$  pools) and collected 2099 avian blood samples at 12 sites in southern NM. Here we only report results for the avian collections. We found significant differences in seroprevalence among habitats ( $X^2 = 19.6$ ,  $df = 3$ ,  $p < 0.001$ ) with desert playas having the lowest seroprevalence. Comparisons among four categories of migratory status in birds (migrants, residents, wintering, and breeding) failed to detect differences in prevalence ( $X^2 = 6.9$ ,  $df = 3$ ,  $p > 0.05$ ). Seroprevalence for after hatch year (AHY) birds was significantly greater than for hatch year (HY) birds ( $X^2 = 46.9$ ,  $df = 1$ ,  $p < 0.0001$ ). Sex was not a significant factor ( $X^2 = 0.33$ ,  $df = 1$ ,  $p > 0.05$ ). Our first hatch year seropositive bird was detected on May 21st, 2004, indicating WNV transmission occurred as early as mid May. This is consistent from other WNV and arbovirus live bird studies (Ringia *et al.* 2004, Reisen *et al.* 2000), suggesting an important role for age class and habitat type in WNV transmission within the avian communities of southern New Mexico. F 1330-1345

- 109 FACTORS AFFECTING NEST AND POST-FLEDGING SURVIVAL IN A SWAINSON'S THRUSH POPULATION. F 1430-1445  
 \***JENNIFER D. WHITE**, Div. Biol. Sci., Univ. Missouri, Columbia, MO 65211; Thomas Gardali, PRBO Conservation Science, Stinson Beach, CA 94970; Frank R. Thompson III, USDA For. Serv., North Central Res. Sta., Columbia, MO 65211; John Faaborg, Div. Biol. Sci., Univ. Missouri, Columbia, MO 65211. We estimated nest and post-fledging juvenile survival for Swainson's Thrushes in central coastal California. We examined the effect of nest-site characteristics (height and concealment), nestling condition, stage of the nest cycle, weather, and seasonal variation on Swainson's Thrush nest survival. For post-fledging juvenile survival, we examined the effect of nestling condition, age of the juvenile, weather, seasonal variation, and parental strategy (e.g., drifting or stationary brood type). We developed *a priori* multivariate models to identify factors explaining variation in nest and juvenile survival using Cox proportional hazards regression. We used an information theoretic approach for model selection. Nest survival models containing the variables nest stage, nest concealment, and nest height were the most supported among the *a priori* candidate models. The probability of a nest surviving the 29-day nesting cycle was 0.298 (95% CI = 0.135 - 0.656) based on an averaged model. The most supported juvenile survival model included age, parental strategy, and weather covariates. The probability of a juvenile surviving 55 days post-fledging was 0.698 (95% CI = 0.540 - 0.902). Juvenile mortality was highest during the first week post-fledging. Predation was the main cause of death both for nests and fledglings. For both nestlings and recent fledglings, the primary predators appeared to be small mammals while important predators of older fledglings appeared to be raptors.
- 110 CAN ECOLOGICAL RISK ASSESSMENT HELP US EVALUATE THE EFFECTS OF OIL SPILLS ON MARINE BIRDS? F 1115-1130  
**JOHN WIENS**, The Nature Conservancy, Arlington, VA 22203; Robert Day and Stephen Murphy, ABR Inc., Fairbanks, AK. In the context of oil-spill impacts on marine birds, Ecological Risk Assessment is a formalized procedure that can be used to define measurable goals (recovery) while recognizing the importance of natural variation and the influences of multiple causal factors. It also emphasizes the ecological significance of effects rather than the effects alone. To explore the utility of this approach, we evaluated impacts of the Exxon Valdez oil spill on Harlequin Ducks and their subsequent recovery in Prince William Sound, Alaska. While initial impacts of the spill on this species are clear, there have been disagreements about its recovery status. The Ecological Risk Assessment approach helps to identify some of the sources of uncertainty, which can be attributed to aspects of study design and interpretation, the dynamics of the ecological systems, and differences in the way "recovery" is operationally defined.
- 111 MODELING DISPERSAL BEHAVIOR AND URBAN POPULATION GROWTH OF AMERICAN CROWS IN THE SEATTLE AREA. F 1045-1100  
**JOHN WITHEY** and John Marzluff, Coll. For. Resources, U. Washington, Seattle, WA, 98195. We radio-tracked 56 juvenile American Crows captured in 2000 and 2001 along an urban gradient in the Seattle area for up to one year after fledging. Fifteen of these were considered 'dispersers,' with centers of activity > 2 km from their natal site ('local' crows' centers of activity were < 1.5 km from their natal site). To test whether crows were drawn into urban areas, we compared movements of dispersers to simulated random walk paths. We found 10 out of 15 dispersers in habitat with higher urban land cover than expected, but this frequency was not significantly different than expected by chance ( $P = 0.15$ ). Based on observed movements we estimated the probability of immigration by crows in their first year of life into the Seattle area as 0.09 and the probability of emigration as 0.15. We used these estimates with existing estimates of survival and fecundity to model population growth of urban and non-urban crows, varying the age classes in which dispersal was allowed and whether the immigrants stayed to breed. The model that most closely resembled observed population growth over the last 50 years included dispersal by hatch-year and second-year age classes with immigrants staying in their new population to breed. It appears that crows exploit productive breeding habitat in the suburbs and exurbs, and fuel urban population growth through dispersal. Such growth will likely continue due to ongoing conversion of forested wild lands to human settlements in the Puget Sound area, unless or until non-urban populations are limited by extrinsic factors (e.g., West Nile virus).
- 112 AVIAN COMMUNITY RESPONSE TO WILDLAND FIRE IN AN URBANIZING LANDSCAPE. R 1045-1100  
 \***ALISA ZYCH**, Dept. Biology, University of California, Riverside 92521; John Rotenberry, University of California, Riverside, 92521. The 2003 wildfires in southern California provided an opportunity to study the effects of fire on the avian community at a local-habitat and landscape scale. Californian coastal birds associate to multiple scale habitat descriptors the spring following intense wildfire in coastal sage scrub and chaparral communities. Individual species correlated to both local habitat and landscape variables in 11 of 17 species in the logistic regression analyses. Landscape models had a significant improvement over local habitat models in 9 of these 11 species. A canonical correspondence analysis showed significant associations of the avian community to all landscape variables and 7 of 13 local habitat variables measured. The majority of these significant local habitat variables were associated with the wildfire; shrub species diversity and shrub cover decreased and the amount of bare-ground increased with the presence of the burn at a local level. Birds appear to be responding to landscape descriptors of wildfire and urbanization more than local habitat variables, unless it is local vegetation associated with the fire. With the loss of natural shrub cover in the fragments due to urbanization and in the large patches due to fire, species demonstrating response to local habitat change may be at higher risk of extinction. Habitat heterogeneity caused by the wildfire poses a greater risk to the California Quail, Rufous-crowned Sparrow, California Gnatcatcher, Bewick's Wren, and Wrentit who demonstrate strong associations to changes in local habitat. Species who maintain their landscape associations regardless of vegetation loss due to the fire appear to be the least vulnerable in this region to fragmentation by urbanization or by wildfire. To maintain native populations effectively, management decisions should be made on both a local habitat and landscape scale. Significant local habitat features, such as high shrub cover, must be present in both the fragments and large patches in order to maintain as many native scrub birds as possible.

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